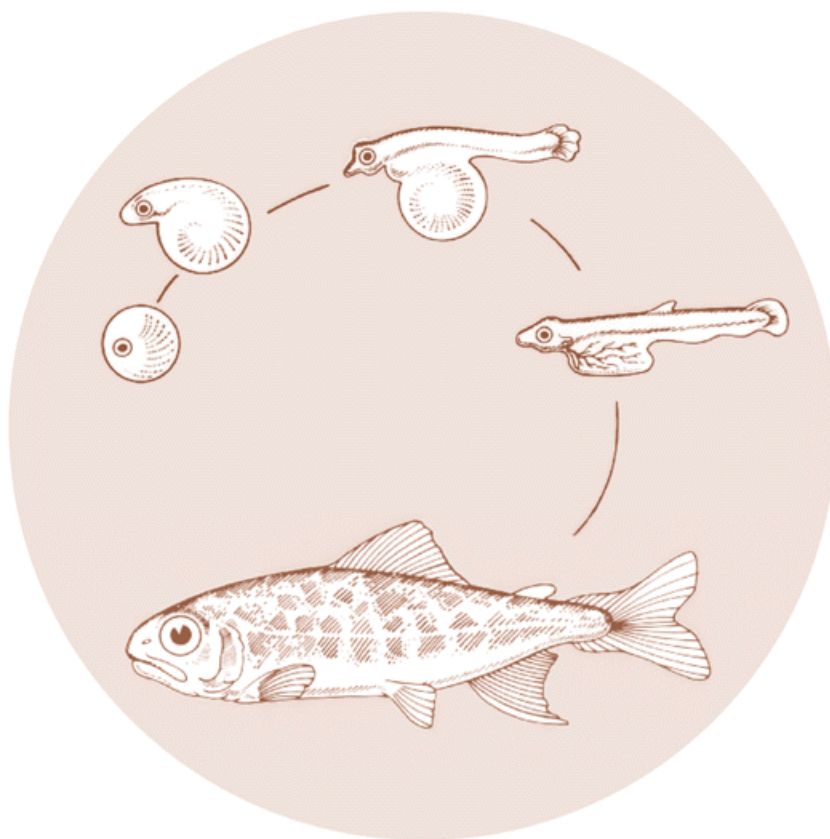


June 1996

OPERATION PLANS FOR ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN

Volume II - Oregon

Annual Report 1995



DOE/BP-60629-10



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OPERATION PLANS FOR ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN

Volume II - Oregon

Annual Report 1995

Prepared by:

Oregon Department of Fish and Wildlife
U.S. Fish and Wildlife Service

Prepared for:

U.S. Department of Energy
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PO Box 3621
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Project No. 92-043
Contract No. DE-BI79-91BP60629

June 1996

INTEGRATED
HATCHERY
OPERATIONS
TEAM



**Operation Plans for Anadromous Fish Production
Facilities in the Columbia River Basin
Volume II-Oregon**

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Codes, Acronyms, and Abbreviations Used in This Report

Species Codes

CHF	Fall Chinook
CHS	Spring Chinook
CHR	Summer Chinook
COH	Coho
CT	Cutthroat Trout (Resident)
RB	Rainbow Trout
SCT	Sea-run Cutthroat Trout
SOC	Sockeye
STS	Summer Steelhead
STU	Sturgeon
STW	Winter Steelhead
Type-N	Late-run Coho
Type-S	Early-run Coho
URB	Upriver Bright Fall Chinook

Disease/Pathogen Codes

BGD	Bacterial Gill Disease
BKD	Bacterial Kidney Disease
C. <i>shasta</i>	<i>Ceraomyxa shasta</i>
CAD	Coho Anemia Disease
Colum.	Columnaris (<i>Flexibactor columnaris</i>)
CWD	Cold Water Disease
EIBS	Erythrocytic Inclusion Body Syndrome
ERM	Enteric Red Mouth
Furunc.	Furunculosis
Ich	<i>Ichthyoph thirius multifiliis</i>
IHN	Infectious Hematopoietic Necrosis
IPN	Infectious Pancreatic Necrosis
MAS	Motile Aeromonas Septicemia
M. cere.	<i>Myxosomacerebralis</i>
VHS	Viral Hemorrhagic Septicemia

Water Supply Codes

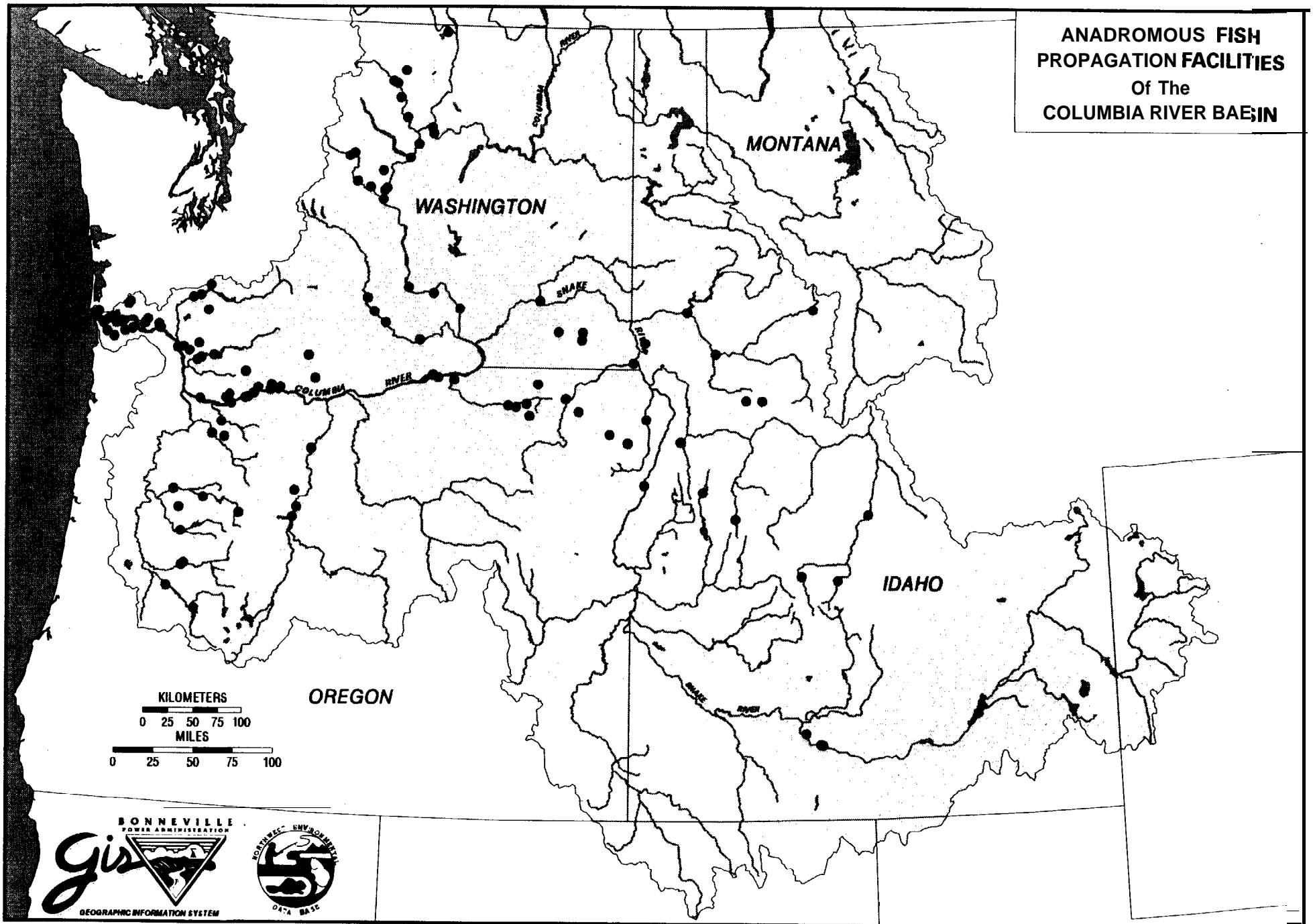
CS	Surface water with no fish present
G	Ground water
S	Surface water
SA	Surface water containing anadromous fish
SR	Surface water with only resident fish
ST	Treated surface water, depurated
SW	Salt water

Acronyms and Abbreviations

BPA	Bonneville Power Administration
CIS	Coordinated Information System
COE	Corps of Engineers
CRITFC	Columbia River Inter-Tribal Fish Commission
CTWSRO	Confederated Tribes of the Warm Springs Reservation of Oregon
CWT	Coded-Wire Tag
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FTE	Full Time Equivalent
IDFG	Idaho Department of Fish and Game
IHOT	Integrated Hatchery Operations Team
LSRCP	Lower Snake River Compensation Plan
NFH	National Fish Hatchery
NMFS	National Marine Fisheries Service
NPPC	Northwest Power Planning Council
ODFW	Oregon Department of Fish and Wildlife
PAC	Production Advisory Committee
PNFHPC	Pacific Northwest Fish Health Protection Committee
PP&L	Pacific Power and Light
PUD	Public Utility District
TAC	Technical Advisory Committee
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife (formerly Washington Department of Fisheries and Washington Department of Wildlife)
YIN	Yakama Indian Nation

Anadromous Fish Production Facilities in the Columbia River Basin

**ANADROMOUS FISH
PROPAGATION FACILITIES
Of The
COLUMBIA RIVER BASIN**

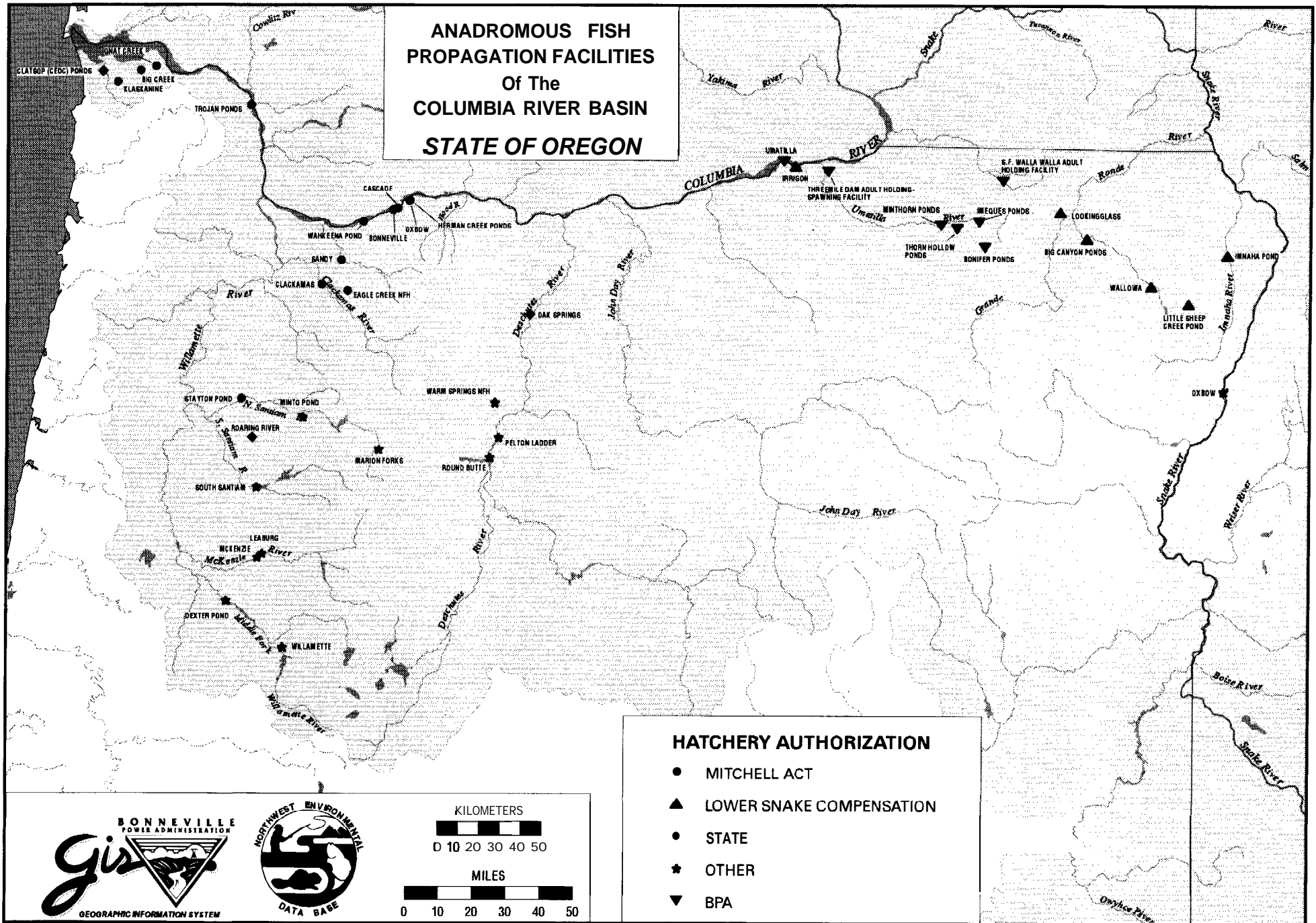
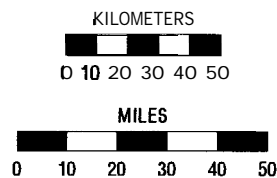
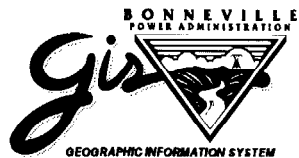


Anadromous Fish Production Facilities in Oregon

ANADROMOUS FISH PROPAGATION FACILITIES Of The COLUMBIA RIVER BASIN STATE OF OREGON

HATCHERY AUTHORIZATION

- MITCHELL ACT
- ▲ LOWER SNAKE COMPENSATION
- STATE
- ★ OTHER
- ▼ BPA



INTEGRATED
HATCHERY
OPERATIONS
TEAM



Oregon Department of Fish and Wildlife Hatchery Operation Plans

Big Creek Hatchery

INTRODUCTION

Big Creek Hatchery is located 16 miles east of Astoria, Oregon and is approximately 3 miles upstream from Big Creek's confluence with the Columbia River. The site elevation is approximately 75 feet above sea level.

The facility includes 2 adult holding ponds, 30 raceways, 1 rearing pond, 64 troughs and 8 stacks of egg incubators. The adult collection and holding ponds are in poor condition and are inadequate to meet current program objectives.

There are four water sources for the hatchery: Big Creek, Mill Creek and two springs. Current water rights total 36,158 gpm plus an additional 4.2 cfs reservoir water right. All water supplies are delivered by gravity but can be pumped for reuse if required. The facility is staffed with 9.25 FTE's.

Rearing Facilities at Big Creek Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding Ponds	80	29.5	2.76	6,513	1	6,513	Concrete	32	Fair	Contains 7 pens
Adult Holding Ponds	95	36.5	4.56	15,860	1	15,660	Concrete	22	Good	
Canadian Troughs	21	2.50	4.56	108	2	216	Fiberglass	7	Good	
Raceways	166	10	2.75	4,400	9	39,600	Concrete	42	Fair	U-shaped
Raceways	80	20	2.75	4,400	21	92,400	Concrete	42	Fair	
Rearing Ponds	85	36	4.75	12,112	1	12,112	Concrete	19	Good	
Troughs	15.5	1.42	0.58	13	48	624	Fiberglass	17	Good	
Troughs	15.5	1.33	1.25	26	16	416	Fiberglass	17	Good	
Vertical Incubators						64	Fiberglass	17	Good	Four, 16-tray stacks

PURPOSE

Big Creek Hatchery began operation in 1941 as a state-funded facility. It was refurbished in 1957 under the Mitchell Act as part of the Columbia River Fisheries Development Program—a program to enhance declining fish runs in the Columbia River Basin. The facility is used for adult collection, egg incubation and rearing of winter steelhead, fall chinook and coho.

GOALS

Fall Chinook and Coho: Produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial and sport fisheries while providing adequate escapement for hatchery production.

Winter Steelhead: Help meet statewide management goals of creating consumptive steelhead fisheries. Production provides harvest objectives for the North Coast, lower Columbia and Willamette River tributaries as well as providing broodstock for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Fall Chinook (Big Creek stock)

Produce 5,700,000 smolts (71,250 pounds) and 5,200,000 fingerlings (38,670 pounds) for on-station release.

Provide 6,810,000 eggs for ODFW programs.

Fall Chinook (Big Creek/Rogue stock)

Produce 1,000,000 smolts (66,778 pounds) for on-station release.

Provide eggs and fingerlings to produce 1,600,000 smolts for the Clatsop Economic Development Commission.

Coho

Produce 535,000 smolts (48,636 pounds) for on-station release.

Produce 60,000 smolts (4,000 pounds) for release into the Tualatin River.

Winter Steelhead

Produce 60,000 smolts (12,000 pounds) for on-station release.

Produce 63,000 fingerlings (6,300 pounds) for transfer to Klaskanine Hatchery.

Provide 557,300 eggs to ODFW programs.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Bie Creek Stock Fall Chinook: Adult fish arrive at the hatchery from late August through mid-October. Peak spawning occurs from late September to early October.

Rogue Stock Fall Chinook: Adults arrive at the hatchery from late August through mid-November. Peak spawning occurs from mid-October to mid-November.

Entry of adults into the subbasin occurs from early September to November. Spawning occurs from October to November with a peak from late-October to early November. Adults are collected at the hatchery.

Winter Steelhead: Adults arrive at the hatchery from late November through late February. Peak spawning occurs from mid-January through mid-February.
Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 2: Minimize Interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Bie Creek Stock Fall Chinook: A time- and size-at-release study is currently underway using the 10,900,000 smolts that are reared and acclimated at Big Creek Hatchery. This study involves the following on-station releases:

- Release 4,000,000 smolts in March at a size of 150 fish/pound
- Release 1,200,000 smolts in April at a size of 100 fish/pound
- Release 5,700,000 smolts in May at a size of 80 fish/pound

Portions of each group are coded-wire tagged.

Bie Creek/Rogue Stock Fall Chinook: Rear and acclimate 800,000 smolts. Release on-site according to the following schedule:

- 166,000 in July at 21 fish/pound or larger
- 334,000 in August at 18 fish/pound or larger
- 500,000 in August at 13 fish/pound or larger

All fish are fin-clipped and portions of the releases are also coded-wire tagged.

~~Two~~ different size-at-release strategies are being tested. The first strategy involves rearing 132,000 acclimated smolts to a size of 11-fish/pound and releasing them on-station in May. The second release strategy involves rearing 403,000 acclimated smolts to a size of 11 fish/pound and releasing them on-station in June. Portions of both releases are coded-wire tagged. Approximately 60,000 smolts at 14 fish/pound are trucked for release into the Tualatin River, a portion of which are coded-wire tagged.

Winter Steelhead: Rear and acclimate 60,000 smolts; release on-site in April at a size of 5 fish/pound. Mark all fish prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Big Creek Hatchery:

Big Creek Stock Fall Chinook: Adults are collected throughout the run and spawned at a 1:3 male-to-female ratio. Any ~~mainstem~~ Columbia River tule stock is approved for broodstock use at this facility.

Big Creek/Rogue Stock Fall Chinook: The interim practice is to collect all returning adults and use only Big Creek/Rogue River stock for broodstock. Fish are spawned at a 1:2 male-to-female ratio, depending on run size.

~~Coho~~ adults are collected at the trap and spawned at a 1:2 male-to-female spawning ratio. Any lower mainstem, Columbia River ~~coho~~ stock is acceptable for broodstock use.

Winter Steelhead: The winter steelhead stock is primarily from Big Creek. During years of low stock returns, however, adults (Big Creek stock) are also collected at Klaskanine Hatchery. Adults are spawned at a 1:1 male-to-female spawning ratio. The majority of the run is comprised of hatchery fish.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- **Apply** a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in

the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.

- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Big Creek Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery (bimonthly examinations from October through February). The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each lot of adult fish. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results

from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- One stock of adult fall chinook is injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- A separate mortality picker is kept for each pond or lot.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

•

Objective 5: Conduct environmental monitoring.

Environment@Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*—details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*—document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Big Creek Hatchery receives approximately 5,000 visitors per year. The hatchery also conducts numerous tours for school and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-BIG CREEK HATCHERY

Objective 1

Measures	Species	Hatchery Goal¹	5-Year Average	Range	Constraints
Adult Capture	Big Cr. CHF	7,150	5,229 ²	3,816-7,150 ²	2,3,6,12
	Rogue CHF	2,100	1,094	633-2,203	2,3,6,12
	COH	800	4,645	740-6,384	2,3,6,12
	STW	450	507 ¹	349-739	2,3,6,12
Adult Prespawning Survival	Big Cr. CHF	93%	92.4%	82.6-98.0%	3,6,12
	Rogue CHF	90%	93.3%	88.8-97.9%	3,6,12
	COH	88%	89.2%	83.6-94.6%	3,6,12
	STW	98%	99.3%	98.8-100%	3,6,12
Egg-take	Big Cr. CHF	16,000,000	12,314,000	7,673K-17,287K	3,7
	Rogue CHF	2,900,000	1,363,638	558K-2,941 K	3,7
	COH	730,000	1,783,690	452K-3,821K	3,7
	STW	815,000	952,417	610K-1,202K	3,7
Green Egg-to-Fry Survival	Big Cr. CHF	95%	90.2%	88.6-92.5%	2,4
	Rogue CHF	95%	88.1%	82.2-89.6%	2,4
	COH	95%	83.5%	76.4-88.3%	2,4
	STW	95%	84.8%	74.7-94.0%	2,4
Fry-to-Smolt Survival	Big Cr. CHF	95%	98.1%	94.1-99.5%	2,4,9,11-13,17
	Rogue CHF	95%	93.2%	90.4-94.9%	2,4,9,11-13
	COH	95%	89.1%	77.7-92.8%	2,4,9,11-13,17
	STW	95%	87.0%	72.2-95.9%	2,4,9,11-13,17
Fish Releases	Big Cr. CHF	10,900,000	7,120,412	6,963K-7,562K	1,2,9,10
	Rogue CHF	1,000,000	654,151	134K-1,143K	11,13,16
	COH	595,000	611,469	526K-717K	11,13,16
	STW	110,000	88,300	62K-125K	11,13,16

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Includes jack counts.

Objective 1 (continued)

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Egg Transfers	Big Cr. CHF	6,810,000	-- ¹	-- ¹	8
	Rogue CHF	0	-- ¹	-- ¹	
	COH	20,000	-- ¹	-- ¹	
	STW	689,850	-- ¹	-- ¹	
	CT	15,000	-- ¹	-- ¹	
Fish Transfers	Big Cr. CHF	0	-- ¹	-- ¹	11
	Rogue CHF	800,000	-- ¹	-- ¹	11
	COH	60,000	-- ¹	-- ¹	11
	STW	63,000	-- ¹	-- ¹	11
Adults Passed Upstream	Big Cr. CHF	N/A	N/A	N/A	3,18
	Rogue CHF	N/A	N/A	N/A	3,18
	COH	N/A	N/A	N/A	3,18
	STW	N/A	161	36-349	3,18
	CT	N/A	N/A	N/A	3,18
Percent Survival	Big Cr. CHF	N/A	0.13% ²	0.050.18%	7
	Rogue CHF	N/A	2.33%	1.33-3.74%	
	COH	N/A	3.55%	0.21-8.10%	
	STW	N/A	Unknown	Unknown	

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	Big Cr. CHF	80	78.0	73.6-80.3	1,2,5,9-14
	(fingerling)	100-l 50	141	136-l 76	1,2,5,9-14
	Rogue CHF	13-21	17.8	14.2-l 8.7	1,2,5,9-14
	COH	11	12.6	9.1-20.5	1,2,5,9-14
	STW	5-l 0	5.45	4.7-l 8.7	1,2,5,9-14
Acclimation	Big Cr. CHF	Yes	Yes	--	
	Rogue CHF	Yes	Yes	--	
	COH	Yes	Yes	--	
	STW	Yes	Yes	--	

¹ Not estimated for this report

² Data from only three years

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	Big Cr. CHF	Yes	Yes	--	
	Rogue CHF	Yes	Yes	--	
	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Pop. >500	Big Cr. CHF	Yes	Yes	--	
	Rogue CHF	Yes	No	--	
	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Ratio Male:Female	Big Cr. CHF	1:3	Yes	--	
	Rogue CHF	1:2	N/A	--	
	COH	1:2	Yes	--	
	STW	1:1	Yes	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	Big Cr. CHF	Yes	Yes	--	
	Rogue CHF	Yes	N/A	--	
	COH	Yes	Yes	--	
	STW	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply</u>		<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
	<u>Inc.</u>	<u>Rear.</u>				
<u>Big Creek Hatchery</u>	S	S				
CHF/13				+		
CHF/52				+		
COH/13				+		CAD & EIBS
SCT/13						
STW/13						

(Note: This is only a summary of **reportable** pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	2,15,16
TSS Max. Effluent	All	<15 mg/L	Yes	--	2,15,16
SS Effluent	All	<0.1 ml/L	Yea	--	2,15
SS Max. Effluent	All	<0.2 ml/L	Yes	--	2,15
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments—Big Creek Hatchery

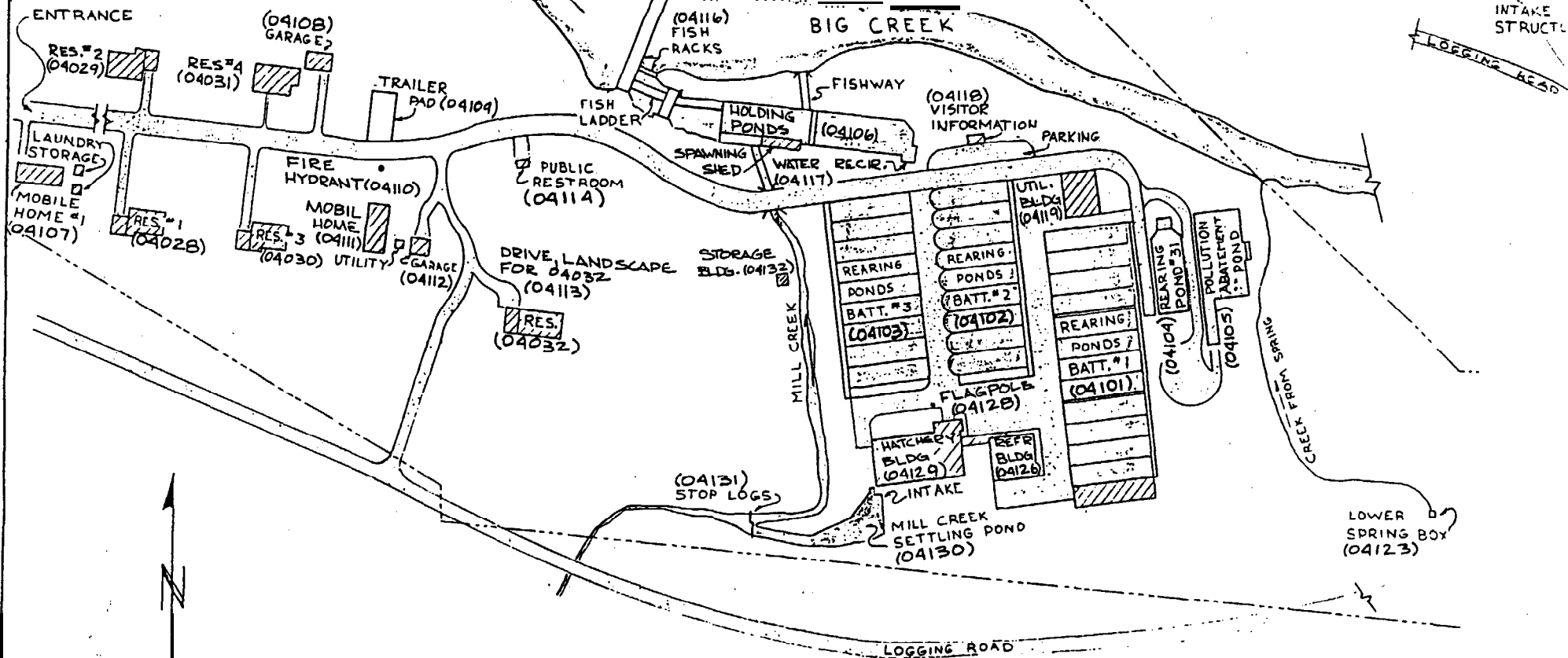
Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. The current water delivery system limits the amount of water to the rearing pond which reduces fish rearing potential.
2. Logging in the watershed has caused water quality concerns (siltation and water turbidity) at the hatchery. The existing sediment settling pond is too small and does not keep sediment out of the rearing ponds during roily water conditions. During high flows, siltation in the rearing ponds is a major problem and potential cause of fish mortality. Sedimentation in egg incubation units is a potential detriment to egg-to-fry survival.

3. The adult holding and spawning area is inefficient and inadequate for handling the several species and large numbers of adult fish that return to this facility. Adult fish must be handled several times resulting in some stress-related mortality.
4. Pathogen-free water is needed, especially for egg development and early rearing.
5. Need heated or chilled water to improve egg incubation or early rearing conditions to better meet management needs.
6. Periodic low instream flow's for returning adults and holding.
7. At times, there are insufficient numbers of returning broodstock to make the fall chinook program.
8. Antiquated and inadequate egg incubation facilities prevent the hatchery from meeting current program goals.
9. Oxygen supplementation is needed to significantly increase fish production, especially during low water flow periods.
10. Design and condition of old ponds makes pond management both labor and time intensive and difficult to clean.
11. Need avian predator control measures for all ponds.
12. Surveillance devices are needed for the hatchery building and ponds. A security gate would be of some use.
13. Battery 2 ponds (13-21) are poorly designed and need more water supply capacity.
14. Pollution abatement facilities, as installed, are inadequate and require extra work and time to clean the ponds (i.e., pond drains are too small, lift station needs frequent attention).
15. Need equipment to conduct the suspended solids test.
16. A fingerling release channel, that is designed for fish passage, is needed.
17. Water intake design could be improved to facilitate cleaning.
18. Need a portable tank to haul adults around the barrier dams.

BIG CREEK

NOTE:
 04100 LAND
 04115 ROADS, DRIVEWAYS & PAVING
 04121 PIPELINE, FROM DAM TO POND
 04125 RUNWAYS FOR LEKTROKART
 04127 PIPE BRIDGE
 04133 POND SCREENS
 04134 SAFETY REQUIREMENT MATERIAL
 04135 GRATINGS, WALKWAYS
 04136 PIPELINES, POND AREA
 04131 POND LIGHTING
 04138 ALARM SYSTEM
 04134 DOMESTIC WATER PIPELINE



04141 - GARAGE / STORAGE / WOODSHED
 04143 - MOBILE HOME ALLEN BROOK

INVENTORY NUMBERS SHOWN IN ()

Bonneville Hatchery

INTRODUCTION

Bonneville Hatchery is located just west of Cascade Locks, Oregon at Bonneville Dam on the Columbia River. Site elevation is approximately 46 feet above sea level.

The rearing facilities include 30 raceways, 28 Burrows or converted Burrows ponds, and 3 adult holding ponds (also used for fish rearing). The condition of the rearing facilities ranges from fair to good.

The hatchery water supply is obtained from two sources: Tanner Creek and wells. Water from Tanner Creek is supplied by gravity; however, it sometimes freezes in December and January so it is not a reliable water supply during those months. Water is reused through the adult capture and holding system. The facility is staffed with 14 FTE's.

Rearing Facilities at Bonneville Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding/ Rearing Ponds	154	27	62	4,946	1	24,948	Concrete	20	Good	
Adult Holding/ Rearing Ponds	123	76	7	65,436	1	65,436	Concrete	20	Good	Divided into 2 Ponds
Circular Tanks		6	2.5	71	4	264	Fiberglass		Good	
Converted Burrows Ponds	75	16	3	3,606	28	100,800	Concrete	20	Good	
Deep Troughs	14	1.06	1.42	21	60	1,260	Fiberglass	20	Good	
Raceways	80	20	2.75	4,400	30	132,000	Concrete	45	Fair	
Vertical Incubators					1,216		Plastic	10	Good	
Vertical Incubators					1,216		Fiberglass	20	Good	

PURPOSE

Bonneville Hatchery was constructed in 1909 and was originally funded by the state of Oregon. In 1957, the facility was remodeled and expanded as part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin. The hatchery underwent another renovation in 1974 as part of the U.S. Army Corps of Engineers' (COE) mitigation of fish losses from the construction of the John Day Dam. The hatchery

currently receives funding from both the National Marine Fisheries Service (NMFS) and COE.

Bonneville Hatchery is Oregon Department of Fish and Wildlife's largest hatchery facility and has a diverse fish production program. It is used for adult collection, egg incubation and rearing of two fall chinook stocks-lower river tules and upriver brights (URB). It is also used for rearing of spring chinook and coho (spawning and egg incubation usually occurs at Cascade Hatchery). The hatchery has excellent egg and fingerling quarantine facilities which are often used to assist other hatchery programs in the basin.

GOALS

Tule Fall Chinook and Coho: Hatchery goal associated with the Mitchell Act funding is to produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial and sport fisheries.

URB Fall Chinook: The COE's mitigation agreement is to produce no more than 263,000 pounds of juvenile fall chinook, a production level equivalent to the loss of 15,000 wild fall chinook spawners caused by John Day Dam. The remaining mitigation for John Day Dam (production for 15,000 fall chinook spawners) is achieved at Spring Creek National Fish Hatchery.

OBJECTIVES

Objective 1: Hatchery Production

URB Fall Chinook

Provide 2,900,000 eggs to Umatilla Hatchery.

Produce 2,830,000 fingerlings (37,875 pounds) for release into the Columbia River.

Produce 5,325,000 smolts and fingerlings (112,750 pounds) for on-station release.

Produce 225,000 smolts (28,125 pounds) for release into the Umatilla River.

Tule Fall Chinook

Produce 9,100,000 fry (34,000 pounds) for transfer to Stayton Ponds.

Produce 7,950,000 fingerlings (123,080 pounds) for on-station release.

Produce 2,000,000 fingerlings (40,000 pounds) for release into Tanner Creek from the Stayton Ponds.

Spring Chinook

Produce 125,000 Deschutes stock smolts (15,554 pounds) for release into the Hood River.

Coho

Produce 1,175,000 smolts for on-station release.

Summer Steelhead

Incubate eggs from IHNV-positive parents as backup to the Leaburg and South Santiam steelhead programs.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

URB Fall Chinook: Adults arrive at the hatchery between August and November. Peak spawning occurs during November.

Tule Fall Chinook: Adults arrive at the hatchery between August and early October. Peak spawning occurs during late September.

Spring Chinook: No adults are collected at Bonneville Hatchery.

Coho: Adult coho needed to fulfill egg-take goals are collected and transferred to Cascade Hatchery for spawning. Coho juveniles are later transferred back to Bonneville Hatchery for rearing.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the

hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

URB Fall Chinook

- Rear 2,830,000 fish to a size of 80 fish/pound and release off-station (nonacclimated) into the Columbia River in June. A portion of the release is coded-wire tagged.
- Rear 5,325,000 fish to a size of 40 fish/pound and release on-station into Tanner Creek in August. (Some fish may be released into the Umatilla River to assist with development of the Umatilla River program.) A portion of the release is coded-wire tagged.
- Rear 225,000 fish to a size of 8 fish/pound and release off-station into the Umatilla River in March. All fish are coded-wire tagged and fin clipped.
- Rear 200,000 fish to a size of 150 fish/pound and transfer to the CEDC (Clatsop Economic Development Commission) net pens in Young's Bay.

Tule Fall Chinook

- Rear 2,000,000 fish to a size of 125 fish/pound and release on-station in March. Rear 3,950,000 fish to a size of 65 fish/pound and release on-station in April. Rear 2,000,000 fish to a size of 35 fish/pound and release on-station in June. A portion of each release is coded-wire tagged.
- Transfer 4,000,000 fish from Stayton Ponds at a size of 50 fish/pound; acclimate for ten days at Bonneville Hatchery; release **on-station** into Tanner Creek in June. A portion of the release is coded-wire tagged. (See South Santiam Hatchery Plan for additional information.)

Deschutes Stock Spring Chinook: Rear 125,000 fish to a size of 8 fish/pound and release nonacclimated into the West Fork Hood River in April. All fish are coded-wire tagged.

Rehob: 1,175,000 fish to a size of 13 fish/pound and release on-station into Tanner Creek. Approximately 350,000 fish are released in May and the remaining 825,000 are released in June. A portion of each release is coded-wire tagged. These fish are part of a time-of-release study.

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Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Bonneville Hatchery:

URB Fall Chinook: Adults are collected throughout the run and spawned at 1:2 or 1:3 male-to-female spawning ratio depending upon run size (i.e., a 1:2 spawning ratio is used if the run size is between 600-1,000 spawners). Any mainstem Columbia River URB stock is approved for broodstock use at this facility.

Tule Fall Chinook: Adults are collected throughout the run and spawned at 1:2 or 1:3 male-to-female spawning ratio depending upon run size (i.e., a 1:2 spawning ratio is used if the run size is between 600-1,000 spawners). Any mainstem Columbia River tule stock is approved for broodstock use at this facility.

Spring Chinook: No adults are spawned at Bonneville Hatchery (see Round Butte Hatchery Plan).

Chad: Adults are spawned at Bonneville Hatchery (see Cascade Hatchery Plan).

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.

- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Bonneville Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. More frequent monitoring is necessary from April through August. Monitoring samples includes a minimum of 10 moribund/dead fish (if available) and 46 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult fall chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs are water-hardened in iodophor for disinfection. A second iodophor disinfection is given to eggs which are incubated in mass in the deep troughs. This treatment is given after the eggs are shocked and is administered as a flush treatment.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections and for prevention of diseases.

- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies. Some of the incubators have sheet-metal splash guards to decrease cross contamination between incubator stacks.
- Fish transport trucks are disinfected between the hauling of different fish lots.
- From November through June, effluents from raceway batteries A and B are diverted past the adult holding ponds where yearling coho are reared.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.

- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*—changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*—records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*—details the collection and disposition of all adult fish.
- *Monthly Ponded Report*—updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*—details sex, fish length and tag information from all marked adult fish that are captured.

- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels,

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River **Inter-Tribal Fish Commission**, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Bonneville Hatchery receives approximately 1 million visitors each year. The hatchery also conducts numerous tours to school and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-BONNEVILLE HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u> ¹	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	Tule CHF	5,687	8,362	5,545-1 1,840	4,7
	URB CHF	6,656	9,281	5,328-1 3,938	
	COH	3,500	17,991	8,709-27,772	
	CHS	N/A	N/A	N/A	
Adult Prespawning Survival	Tule CHF	95%	92.6%	90.9-95.7%	10
	URB CHF	95%	82.4%	72.1-92.1%	10
	COH	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
Egg-take	Tule CHF	11M	15,285K	10,951 K-20,256K	
	URB CHF	12M	14,937K	10,355K-19,707K	
	COH	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
Green Egg-to-Fry Survival	Tule CHF	95%	91.3%	87.2-94.9%	
	URB CHF	95%	86.8%	84.2-88.9%	
	COH	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
Fry-to-Smolt Survival	Tule CHF	95%	98.0%	93.9-99.3%	5,6,9
	URB CHF	95%	93.4%	85.7-98.6%	5,6,9
	COH	95%	94.7%	84.6-99.5%	
	CHS	N/A	N/A	N/A	
Fish Releases	Tule CHF	7,950,000	9,277,418	7,904K-10,586K	5
	URB CHF	8,155,000	7,225,000	6,017K-9,257K	5
	COH	825,000	853,998	344-1 ,783K	
	CHS	124,400	436,691	179K-482K	
Egg Transfers	Tule CHF	12,000	-- ²	-- ²	
	URB CHF	8,000	-- ²	-- ²	
	COH	0	-- ²	-- ²	
	CHS	0	-- ²	-- ²	
Fish Transfers	Tule CHF	9,100,000	-- ²	-- ²	
	URB CHF	658,000	-- ²	-- ²	
	COH	0	-- ²	-- ²	
	CHS	0	-- ²	-- ²	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

Objective 1 (Continued)

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adults Passed Upstream	Tule CHF	N/A	N/A	N/A	
	URB CHF	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
Percent Survival	Tule CHF	N/A	0.79%	0.02-2.77%	5
	URB CHF(Tanner Cr.)	N/A	1.56%	0.13-3.52%	5
	URB (Umatilla)	N/A	1.60% ¹	0.49-2.77%	
	COH	N/A	2.93%	0.88-6.91%	
	CHS	N/A	0.22% ¹	0.07-0.33%	
	(Hood & Umatilla R.)				

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	Tule CHF	65	62.0	57.8-75.8	6,8
	URB CHF	8.0-80.0	35.6	7.3-86.5	6,8
	URB (Umatilla)	8.0	11.4	7.8-12.6	
	COH	13.0	12.8	9.7-14.2	
	CHS	8.0-12.0	11.2	11.5-16.5	
Acclimation	Tule CHF	Yes	Yes	--	10
	URB CHF	Partial	Partial	--	10
	COH	Yes	Yes	--	
	CHS	Partial	Partial	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	Tule CHF	Yes	Yes		
	URB CHF	Yes	Yes	--	4,7
	COH	Yes	Yes	--	
	CHS	N/A	N/A	--	
Spawning Pop. >500	Tule CHF	Yes	Yes	--	
	URB CHF	Yes	Yes	--	
	COH	N/A	N/A		
	CHS	N/A	N/A	--	
Spawning Ratio Male:Female	Tule CHF	1:3	Yes	--	
	URB CHF	1:3	Yes	--	
	COH	N/A	N/A	--	
	CHS	N/A	N/A	--	

¹ Data for only four years.

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	All	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply</u> <u>Inc.</u> <u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./</u> <u>ERM</u>	<u>Other/Comments</u>
<u>Bonneville Hatchery</u>	G	G,S			
CHF/13			+		
CHF/14		IHN	+		One adult spawner in 1994
CHF/95		IHN	+		CAD & EIBS Adults 1990-I 995
CHS/75			+		
CHS/81			+		
COH/14			+		CAD & EIBS
STS/24			+		
STS/85			+		

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

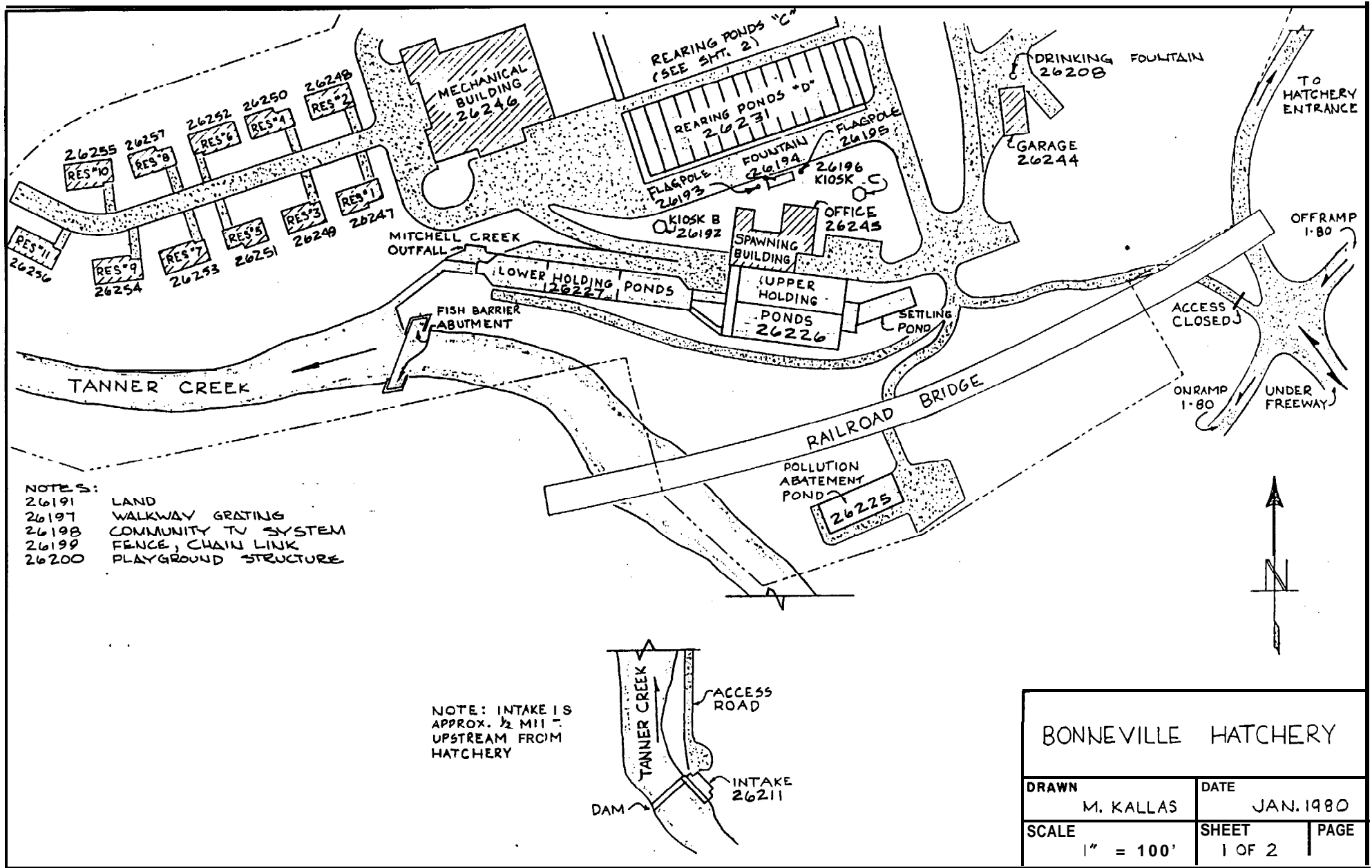
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Y e s	Yes	--	

Constraints/Comments-Bonneville Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

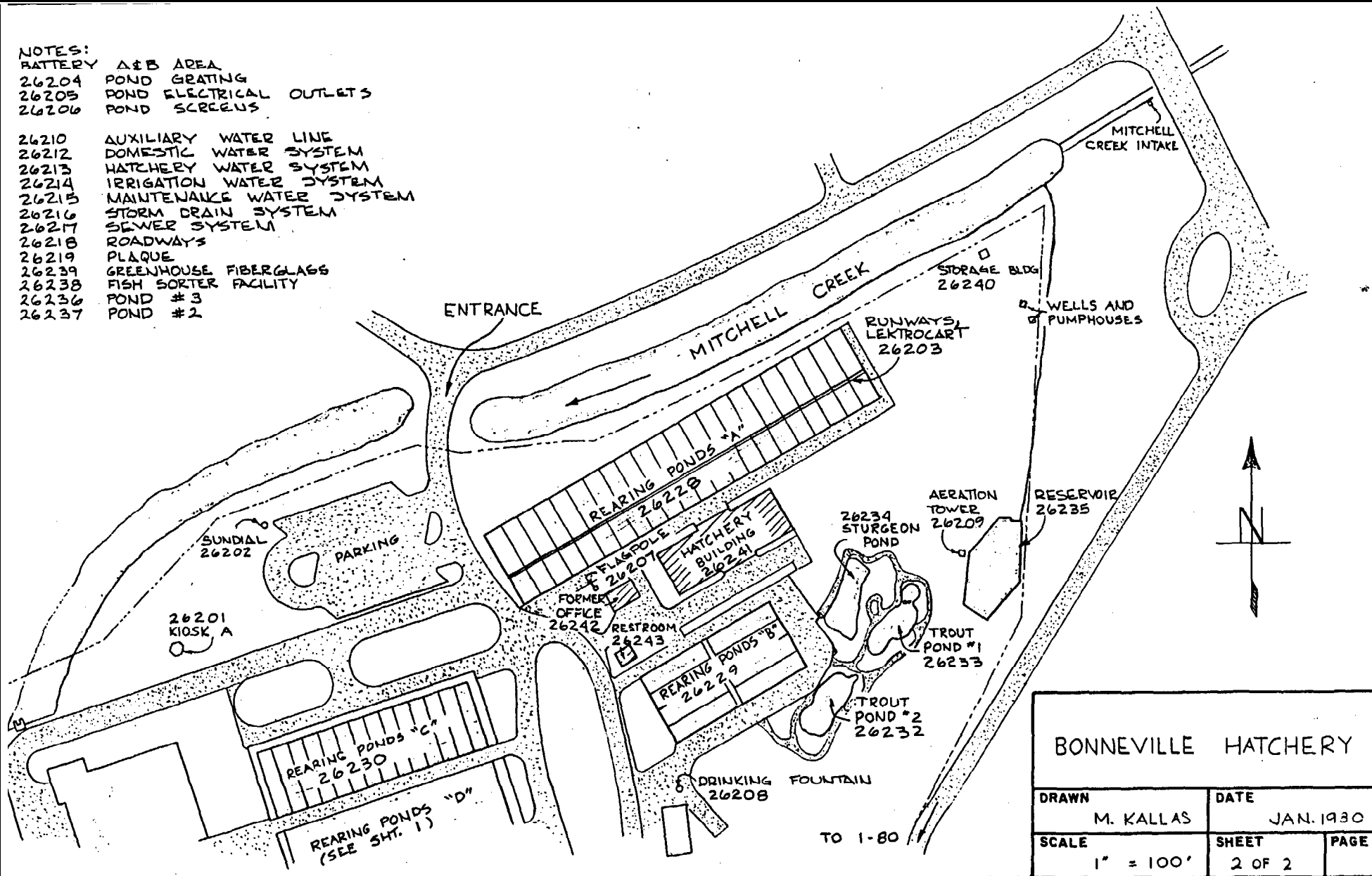
1. Tanner Creek cannot be used as a water source during the winter and late summer.
2. Cold water disease is a chronic problem and bacterial epizootics also cause concern.
3. The hatchery has had major disease problems including bacterial gill disease and erythrocyte inclusion body syndrome (EIBS).
4. The adult holding pond has poor flow patterns and requires the use of re-use water. It is also poorly designed.
5. Predation in the reservoirs during downstream smolt migration causes fish losses.
6. Avian/furbearer predation control is needed at the hatchery.
7. Spawning areas need modifications and improvements.
8. Modification or new development of rearing ponds is needed to meet fish management needs.
9. Need the ability to mass mark the hatchery fish production.
10. Additional water is needed to fully utilize the existing facility.



NOTES:

- BATTERY A&B AREA
 26204 POND GRATING
 26205 POND ELECTRICAL OUTLETS
 26206 POND SCREENS

 26210 AUXILIARY WATER LINE
 26212 DOMESTIC WATER SYSTEM
 26213 HATCHERY WATER SYSTEM
 26214 IRRIGATION WATER SYSTEM
 26215 MAINTENANCE WATER SYSTEM
 26216 STORM DRAIN SYSTEM
 26217 SEWER SYSTEM
 26218 ROADWAYS
 26219 PLAQUE
 26239 GREENHOUSE FIBERGLASS
 26238 FISH SORTER FACILITY
 26236 POND #3
 26237 POND #2



BONNEVILLE HATCHERY

DRAWN	M. KALLAS	DATE	JAN. 1930
SCALE	1" = 100'	SHEET	2 OF 2
		PAGE	

Cascade Hatchery

INTRODUCTION

Cascade Hatchery is located along Eagle Creek near the town of Cascade Locks, Oregon. Site elevation is 100 feet above sea level. It is staffed with 6.5 FTE's.

Facilities include 30 raceways, 1 adult holding pond and 40 troughs. These facilities are in fair to poor condition.

Water is supplied by gravity flow from Eagle Creek. The total water right is 20,197 gpm and the average water usage is about 7,117 gpm.

Rearing Facilities at Cascade Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding Pond	210	35	4.0	22,050	1	22,050	Concrete	35	Fair	Very irregular shape
Deep Troughs	14	1.33	1.17	22	12	264	Fiberglass	5	Good	
Raceways	78	16	2.5	3,120	30	93,600	Concrete	35	Fair	
Shallow Troughs	14	1.33	.5	9	28	252	Fiberglass	5	Good	

PURPOSE

Cascade Hatchery was authorized under the Mitchell Act and began operating in 1959 as part of the Columbia River Fisheries Development Program-a program to enhance declining fish runs in the Columbia River Basin. The facility is used for adult collection, egg incubation and rearing of coho. It is also used for adult collection of fall chinook.

GOALS

Produce coho to help meet the goals of the Columbia River Fish Management Plan (*U.S. v. Oregon Agreement*).

OBJECTIVES

Objective 1: Hatchery Production

Produce 700,000 coho smolts (46,665 pounds) for release into the Yakima River System.

Produce 1,000,000 coho smolts (66,670 pounds) for release into the Umatilla River System.

Provide 1,587,000 coho eggs to Oxbow Hatchery.

Produce 2,100,000 coho fingerlings (14,000 pounds) for transfer to Upper Herman Creek Ponds (Oxbow Hatchery).

Produce 500,000 coho fingerlings (20,000 pounds) for transfer to Lower Herman Creek Ponds (Oxbow Hatchery).

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices **used** at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

~~Coast~~ Coho (Eagle Creek/Tanner Creek stock) return to Eagle Creek from late September to mid-November. Spawning occurs in October and November with a peak in November. Few fish are collected at the hatchery. Most adult coho are transferred from Bonneville Hatchery and are spawned along with the hatchery-returning adults. There is some adult salmon escapement above the hatchery.

Fall Chinook: Adult fall chinook are also occasionally collected at this facility. These fish are used as a backup for other programs.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Rehab 1,700,000 fish to size of 15 fish/pound. Directly release 700,000 smolts into Washington's Yakima River System in early March and 1,000,000 smolts into the Umatilla River System in mid-April.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the interim practice at Cascade Hatchery is to collect adult coho throughout the entire run and spawn at a 1:1 or 1:2 male-to-female ratio depending upon annual coho run size. The Eagle Creek/Tanner Creek stock is the primary broodstock used for coho production at this facility. Sandy, Bonneville and Klaskanine coho stocks are used if there are inadequate hatchery returns.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.

- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Cascade Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish to identify bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on coho salmon eggs and juveniles. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*-measured only when conditions warrant (e.g., periods of low flows and high temperatures).

- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*—records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*—details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.

- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (MOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Cascade Hatchery receives approximately 5,000 visitors per year. The hatchery also conducts numerous tours to school and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-CASCADE HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u> ¹	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	COH	5,910	7,408	5,008-12,073	1,8
Adult Prespawning Survival	COH	95%	72.8%	59.5-93.0%	1,4,8
Egg-take	COH	4,900,000	6,411,623	4,368K-9,901K	2,5
Green Egg-to-Fry Survival	COH	95%	85.7%	77.5-91.5%	2,5
Fry-to-Smolt Survival	COH	95%	91.2%	89.4-92.5%	
Fish Releases	COH	1,700,000	2,362,655	1,502K-2,632K	7,8
Egg Transfers	COH	1,100,000	-- ²	-- ²	
Fish Transfers	COH	2,100,000	-- ²	-- ²	7
Adults Passed Upstream	COH	N/A	N/A	N/A	1
Percent Survival	COH (Umatilla R.)	N/A	1.82%	0.16-4.11%	8
	COH (Yakima R.)	N/A	0.94%	0.07-1.99%	8

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	COH	15.0	15.8	10.7-22.0	2
Acclimation	COH	No	No		

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	COH	Yes	Yes	--	1,4,8
Spawning Pop. >500	COH	Yes	Yes	--	
Spawning Ratio Male:Female	COH	1:1	Yes	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	COH	Yes	Yes	--	

History of Reportable Pathogens-I 990-I 995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Cascade Hatchery</u>	S	S				
COH/11				+		CAD & EIBS
COH/14s				+		CAD & EIBS

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4 5 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

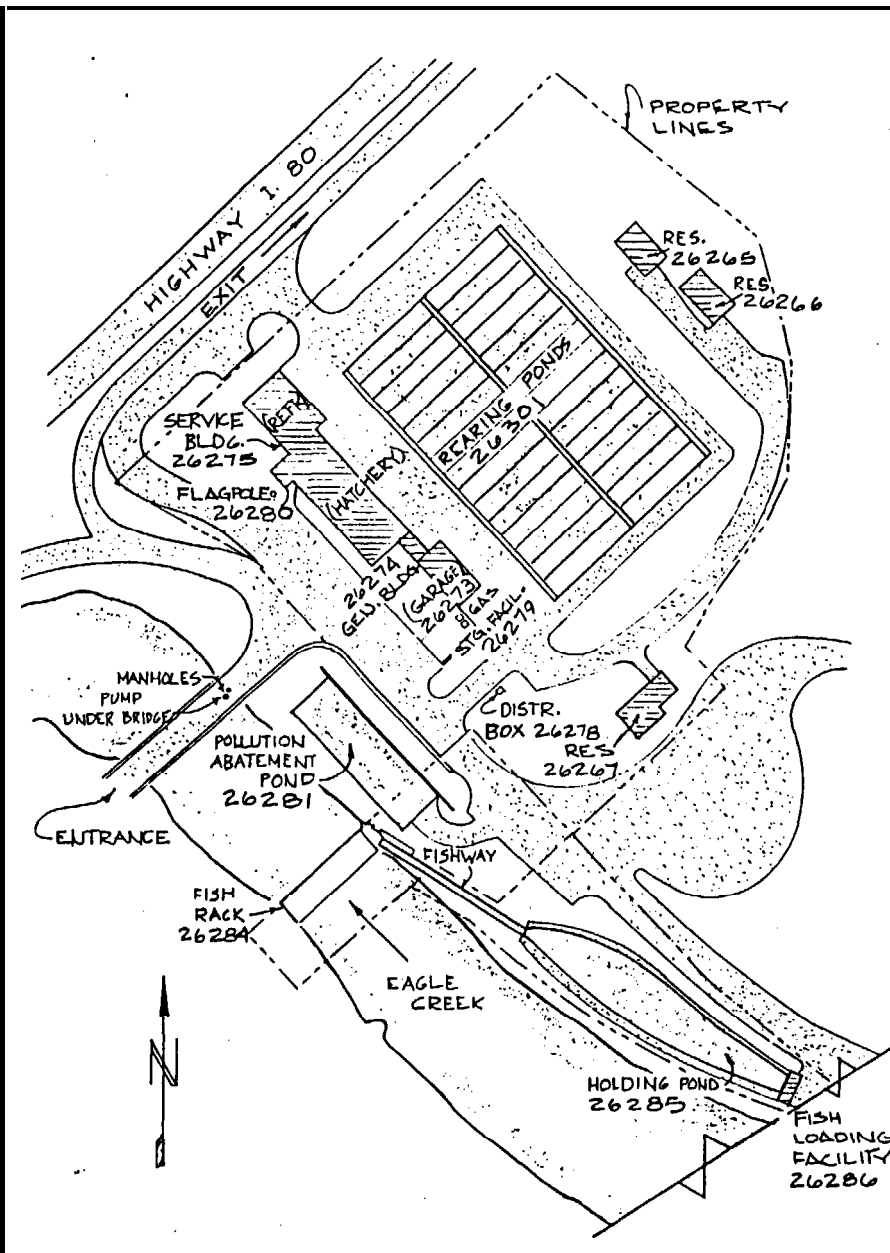
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes		

Constraints/Comments-Cascade Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. A new fish weir is needed for trapping adults.
2. Extremely cold water temperatures during egg incubation and early rearing slows egg development and fish growth. Capabilities for heating water are needed.
3. The water intake occasionally ices-up which restricts the water supply. Slush ice can be delivered to the raceways where it can displace water and cause severe fish losses.
4. The adult holding pond is an unusual shape and there is no easy way to keep adults separated.

5. A new water supply box installed at higher elevation is needed for proper operation of the egg incubation system.
6. Incubators are needed to replace the troughs. This would provide extra room in the hatchery house to install Canadian-style troughs. Coho fry could then be started in these troughs rather than the rearing ponds.
7. Avian predator protection measures are needed.
8. Predation in the reservoirs during out-migration reduces fish survival.
9. Lack of funding over the past decade has created a serious deferred maintenance and equipment backlog.

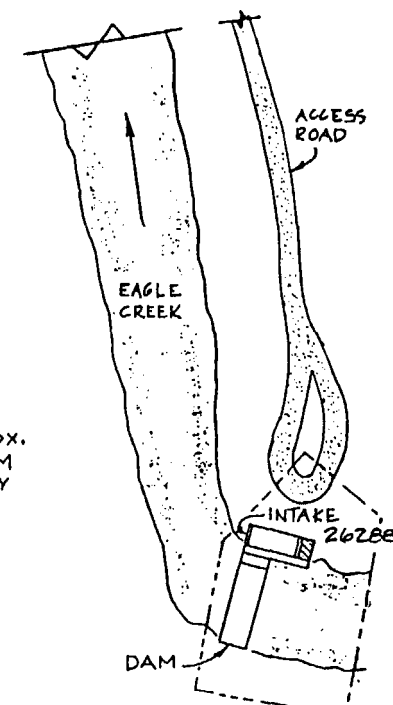


11,500 GAL. WATER
 STORAGE TANK
 26289



SPRING ↪

NOTE:
 INTAKE IS APPROX.
 2900' UPSTREAM
 FROM HATCHERY



NOTES:

26276 SEPTIC TANK/DRAINS
 26277 FENCE, WOOD
 26282 FENCE (POLL. ABATE)
 26283 CONTROL BOX B
 26287 PIPELINE
 26290 WATER SYSTEM (PUMP/HEATER)
 26291 PAVING/ROADWAY
 26292 CURBS, WALKS, RET. WALL
 26293 FENCE, LINK
 26294 POND SCREENS
 26295 SAFETY REQ'D. MAT.
 26300 LAND USES PERMIT
 29296 STORAGE BLDG.
 29297 "MODIFICATIONS" DANEAL CONST

CASCADE HATCHERY

DRAWN		DATE	
M. KALLAS		FEB. 1980	
SCALE		SHEET	PAGE
1" = 100'			

Clackamas Hatchery and Satellites (Clackamette Cove, Marmot Pond, Hublou Harbor)

INTRODUCTION

Clackamas Hatchery is located on the Clackamas River, approximately 5 miles west of Estacada, Oregon. Site elevation is 313 feet above sea level. The hatchery is operated with 5.3 FTE's.

Rearing units are in good condition and consist of 3 rearing ponds, 10 raceways and 2 adult holding ponds. The adult holding ponds are not used to rear juveniles. Water rights total 44,354 gpm from the Clackamas River and a well. The Clackamas River provides the majority of water used for hatchery operations. All ponds and raceways receive single-pass water.

Rearing Facilities at Clackamas Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding Ponds	64	15	4.0	5,040	2	10,600	Concrete	15	Good	
Raceways	75	17	3.2	4,060	4	16,320	Concrete	15	Good	Water delivery problems
Raceways	75	17	32	4,060	6	24,460	Concrete	6	Good	
Rearing Ponds	300	50	45	67,500	2	135,000	Asphalt/Concrete	15	Good	
Rearing Ponds	300	50	4.5	67,500	1	67,500	Asphalt/Concrete	6	Good	
Canadian Troughs	16	1.42	1.25	26	2	56	Fiberglass	7	Good	
Vertical Incubators					320		Fiberglass	15	Good	20, 1 B-tray stacks

PURPOSE

Clackamas Hatchery began operation in 1979 and is operated from four funding sources: Oregon Department of Fish and Wildlife (ODFW), National Marine Fisheries Service (NMFS), Portland General Electric (PGE) and the City of Portland. The NMFS funding is part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin. PGE and the City of Portland provide funding as mitigation for fishery losses caused by hydroelectric development in the Sandy and Clackamas river systems.

Clackamas Hatchery is used for adult collection, egg incubation and rearing of spring chinook. It is also used for adult collection, egg incubation and rearing of winter steelhead (spawning and egg incubation of the Eagle Creek stock occurs at Eagle Creek National Fish Hatchery). The hatchery also provides support for the smolt acclimation facilities at Clackamette Cove and Hublou Harbor on the Clackamas River and for the Marmot Pond on the Sandy River.

GOALS

The PGE mitigation agreement calls for the annual production of no more than 37,209 pounds of salmon and steelhead. The City of Portland mitigation goal is for no more than 32,000 pounds of spring chinook and steelhead. The remaining hatchery production is to contribute to the Columbia River sport and commercial fisheries, and to meet subbasin fishery management goals.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Provide 1,781,000 eggs for ODFW hatcheries and the Salmon and Trout Enhancement Program.

Produce 976,670 smolts (98,880 pounds) for on-station release into the Clackamas River.

Produce 50,000 smolts (5,000 pounds) for release into the Clackamas River from the Clackamette Cove net pens.

Produce 30,000 smolts (3,000 pounds) for release into the Clackamas River from the Hublou Harbor net pens.

Produce 360,000 smolts (41,110 pounds) for release into the Sandy River.

Produce 100,000 smolts (10,000 pounds) for release into the Sandy River from the Marmot acclimation pond.

Winter Steelhead

Produce 30,000 smolts (5,000 pounds) for on-station release into the Clackamas River.

Produce 30,000 smolts (5,000 pounds) for release into the Sandy River.

Rear 45,000 fry (225 pounds) for transfer to Oak Springs Hatchery (wild Clackamas River stock).

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: Adults arrive in the Clackamas River from May through September. Peak spawning occurs in late September. Adults are collected at the hatchery.

Winter Steelhead: Wild steelhead adults arrive in the Clackamas River from February through May, with peak spawning in May. These adults are collected at the Faraday Dam fish collection facility and transported to Clackamas Hatchery for spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Spring Chinook

- Rear 616,700 fish to a size of 11 fish/pound and release on-station in mid-August. A portion of the release is coded-wire tagged.
- Rear 360,000 fish to a size of 9 fish/pound and release on-station in mid-March. A portion of the release is coded-wire tagged.
- Rear 50,000 fish to a size of 10 fish/pound; transfer to the Clackamette Cove net pens in late February; acclimate for three weeks and release directly into the Clackamas River.
- Rear 30,000 fish to a size of 10 fish/pound; transfer to the Hublou Harbor net pens in late February; acclimate for three weeks and release into the Clackamas River.

- Rear 360,000 fish to a size of 9 fish/pound and release into the Sandy River in mid-March. A portion of the release is coded-wire tagged.
- Rear 100,000 fish to a size of 10 fish/pound; transfer to the Marmot acclimation pond in late February; acclimate for three weeks and release directly into the Sandy River.

Winter Steelhead: Rear 60,000 fish to a size of 6 fish/pound; make on-station release into the Clackamas River (30,000) and off-station release into the Sandy River (30,000) in mid-April. All steelhead are marked (fin clipped) prior to release. The Sandy River releases are not acclimated.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Clackamas Hatchery:

Spring Chinook: Adults are collected throughout the entire run and spawned at a 1:2 male-to-female ratio. The Willamette River spring chinook is the accepted broodstock.

Winter Steelhead: Adults are collected throughout the run and spawned using a matrix of available ripe fish at spawning time. Only wild Clackamas River winter steelhead are used for spawning.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Clackamas Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs are water-hardened in iodophor for disinfection.

- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.
- Ozone-disinfected water is provided for incubation and early rearing of winter steelhead to be shipped to Oak Springs Hatchery.
- Spring chinook juveniles are not held at Clackamas Hatchery from mid-August to early November to avoid exposure to IHN virus in the water supply.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.

- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisor-v Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Outreach which includes staff from Portland General Electric, City of Portland, National Marine Fisheries Service and ODFW is held each year to discuss hatchery operations.

Communication with the General Public

Clackamas Hatchery receives approximately 20,000 visitors per year. The hatchery also conducts numerous tours to school and other groups and participates in local fairs, Free Fishing Day activities and is a member of the local Chamber of Commerce.

PERFORMANCE STANDARDS—CLACKAMAS HATCHERY AND SATELLITES

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHS STW	750 40	3,494 46'	1,847-4,635 40-57	1
Adult Prespawning Survival	CHS STW	95% 95%	94.6% 89.0%	90.5%-97.1% 77.5%-95.2%	4,5
Egg-take	CHS STW	2,052,000 52,000	2,315,124 64,359 ²	2,178K-2,493K 58K-78K	
Green Egg-to-Fry Survival	CHS STW	95% 95%	— ³ 88.2% ²	— ³ 81 .0-94.2%	
Fry-to-Smolt Survival	CHS STW	95% 95%	98.3% 87.2%	96.8-99.4% 67.4-96.5%	1,2,3,4,5,6 1,2,3,4,5,6
Fish Releases	CHS STW	1,516,670 60,000	1,550,461 66,209	1,511 K-I, 580K 60K-75K	6
Egg Transfers	CHS STW	1,781,000 0	— ³ — ³	-- ³ -- ³	
Fish Transfers	CHS STW	0 40,000	-- ³ -- ³	-- ³ -- ³	
Adults Passed⁴ Upstream	CHS STW	N/A N/A	N/A N/A	N/A N/A	
Percent Survival	CHS STW	N/A N/A	0.58% Unknown	0.07-I .17% Unknown	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Four years of data.

³ Not estimated for this report

⁴ No hatchery barriers.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS STW	9.0-11.0 6.0	11.1 5.0	8.0-11.7.8 5.5-6.4	
Acclimation	CHS STW STS	Partial Partial Yes	Partial Partial N/A	-- -- --	6 6

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHS STW STS	Yes N/A N/A	Yes N/A N/A	-- N/A N/A	
Spawning Pop. >500	CHS STW STS	Yes N/A N/A	Yes N/A N/A	-- N/A N/A	
Spawning Ratio Male:Female	CHS STW STS	1:2 1:1 N/A	Yes N/A N / A	-- N/A N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHS STW STS	Yes Yes Yes	Yes N/A N/A	-- -- --	

History of Reportable Pathogens-1 990- 1995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Rear.</u>	<u>Supply Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Clackamas Hatchery</u>	CS	S				
CHS/19				+		
COH/19						
STW/20						
STW/16			IHN			IHNV in fingerlings, 1995
STW/122			IHN			IHNV in spawning adults

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4 5 mg/L	Yes	--	
SS Effluent.	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0 - 9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments—Clackamas Hatchery

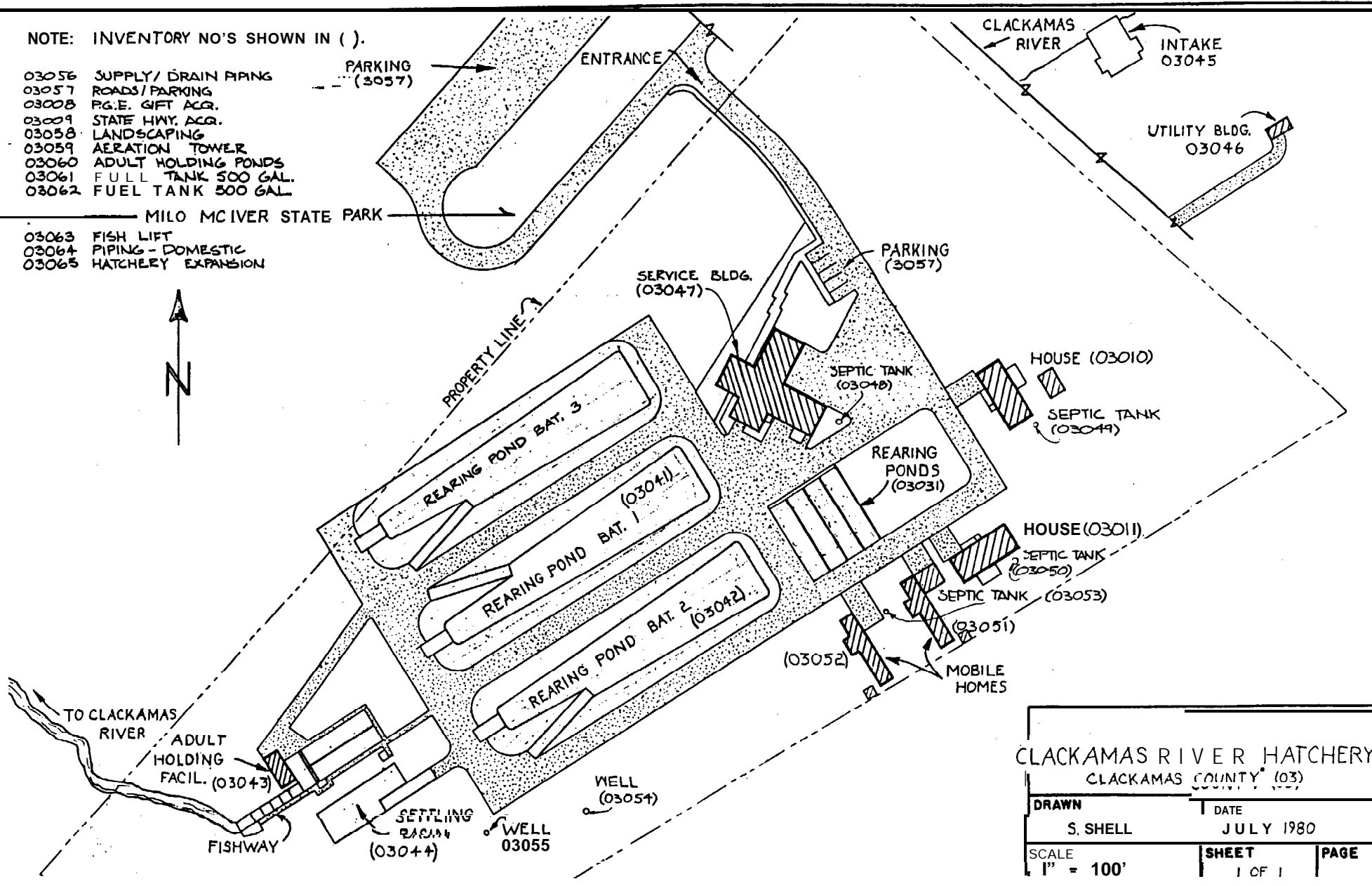
Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

- 1 . High water temperatures and plankton blooms produce periodic water quality problems during summer flows.
2. Additional water pumps and a new water supply pipeline are needed to permit use of all ten raceways. Only 5 of the 10 raceways can now be used.
3. A water supply line from River Mill Dam is needed to alleviate high costs of electricity for pumping water. This alternative would reduce electricity costs and the costs for pump and backup generator maintenance.
4. High water temperatures and water-borne diseases have reduced the hatchery production.
5. Need for fish therapeutants is high.
6. Adult spring chinook returns could be increased if more fish were released in March. An additional facility is needed to rear spring chinook fingerlings from the eyed-egg stage to a size of 20 fish/pound by November.

NOTE: INVENTORY NO'S SHOWN IN ().

03056 SUPPLY/ DRAIN PIPING
 03057 ROADS/ PARKING
 03008 P.G.E. GIFT ACQ.
 03009 STATE HWY. ACQ.
 03058 LANDSCAPING
 03059 AERATION TOWER
 03060 ADULT HOLDING PONDS
 03061 FULL TANK 500 GAL.
 03062 FUEL TANK 500 GAL.

MILO MCIVER STATE PARK
 03063 FISH LIFT
 03064 PIPING - DOMESTIC
 03065 HATCHERY EXPANSION



CLACKAMAS RIVER HATCHERY CLACKAMAS COUNTY (03)

DRAWN	DATE
S. SHELL	JULY 1980
SCALE	SHEET
1" = 100'	1 OF 1
	PAGE

Gnat Creek Hatchery

INTRODUCTION

Gnat Creek Hatchery is located along Gnat Creek, a lower Columbia River tributary approximately 17 miles east of Astoria, Oregon. Facility elevation is about 90 feet above sea level. It is operated with 4.0 FTE's.

Rearing units include 15 raceways which are in fair to poor condition. Water rights total 21,643 gpm from Gnat Creek, an unnamed stream and a well. Hatchery water is delivered by gravity flow from Gnat Creek. Water flows range from a high of 15,700 gpm to a low 1,200 gpm. Well water is used for domestic purposes and the unnamed stream is not currently used for fish culture.

Rearing Facilities at Gnat Creek Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Raceways	100	16	4	6,400	15	96,000	Concrete	34	Fair-Poor	
Starter Tanks	30	3	2.5	225	6	1,350	Concrete	34	Good	
Troughs					24		Aluminum	34	Good	

PURPOSE

Gnat Creek Hatchery was constructed in 1960 as part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin. The facility is used for egg incubation and rearing of summer and winter steelhead. Most of the production is release off-station.

GOALS

Hatchery production is designed to meet harvest objectives of creating consumptive steelhead trout fisheries for the North Coast, lower Columbia River and Willamette River tributaries.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead

Produce 446,000 smolts (90,000 pounds) for release into Clackamas, Sandy, Tualatin, Gales Creek, N. Fork Scapoose, Clatskanie, Lewis and Clark, and Gnat Creek river systems.

Summer Steelhead

Produce 210,000 smolts (42,050 pounds) for release into the Clackamas, Salmon and Molalla river systems.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

There are no adult fish collected at this hatchery. Eggs or fingerlings are transferred in from other facilities.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Winter Steelhead: Receive eggs from Big Creek Hatchery; rear 446,250 fish to a size of 5 fish/pound; make April releases into the Clackamas (125,000), Sandy (200,000), Molalla (31,250), Tualatin (10,000), Gales Creek (20,000), N. Fork Scapoose (10,000), Gnat Creek (40,000) and Clatskanie (10,000) river systems. Some of the Clackamas and Sandy River releases are acclimated. All fish are fin-clipped prior to release.

Summer Steelhead: Receive fingerlings from Oak Springs Hatchery; rear 210,000 fish to a size of 5 fish/pound; make April releases into the Clackamas (135,000), Salmon/Zigzag (40,000) and Molalla (35,000) river systems. None of these fish are acclimated. All fish are fin-clipped prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Gnat Creek Hatchery:

Winter Steelhead: No spawning is conducted at this facility. Winter steelhead are spawned at Big Creek Hatchery utilizing Big Creek stock (see Big Creek Hatchery Plan for further details). Occasionally, winter steelhead from Klaskanine Creek is used as a backup stock. No other stocks are acceptable.

Summer Steelhead: No spawning is conducted at this facility. Summer steelhead are spawned at Oak Springs Hatchery utilizing South Santiam stock (see Oak Springs Hatchery Plan for further details). Any Willamette or Skamania summer steelhead stock is also acceptable for broodstock use.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.

- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Gnat Creek Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs and juveniles. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

. Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.

- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.
- A barrier prevents adult steelhead from entering Gnat Creek above the hatchery intake.

-Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.

- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keening: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*—details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*—records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.

- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatcher-v Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

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Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, US. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Gnat Creek Hatchery receives approximately 1,000 annual visitors. The hatchery also conducts numerous tours to school' and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-GNAT CREEK HATCHERY AND SATELLITE

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	STW STS	N/A N/A	N/A N/A	N/A N/A	
Adult Prespawning Survival	STW STS	N/A N/A	N/A N/A	N/A N/A	
Egg-take	STW STS	N/A N/A	N/A N/A	N/A N/A	
Green Egg-to-Fry Survival	STW STS	95% N/A	98.8% N/A	95.9-97.5% N/A	
Fry-to-Smolt Survival	STW STS	95% 95%	94.5% 97.1%	92.6-96.1% 95.8-98.6%	1,2 1,2
Fish Releases	STW STS	446,250 175,000	472,000 230,681	402K-531K 189K-273K	1,2, 1,2,
Egg Transfers	STW STS	0 0	-- ² -- ²	-- ² -- ²	
Fish Transfers	STW STS	0 0	-- ² -- ²	-- ² -- ²	
Adults Passed Upstream	STW STS	N/A N/A	N/A N/A	N/A N/A	
Percent Survival	STW STS	N/A N/A	Unknown Unknown	Unknown Unknown	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STW	6.0	6.0	4.7-7.5	1,2
	STS	5.0	6.9	5.5-7.3	1,2
Acclimation	STW	Partial	Partial	--	
	STS	No	No		

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	STW	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	
Spawning Pop. >500	STW	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	
Spawning Ratio Male:Female	STW	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	STW	Yes	Yes	--	
	STS	Yes	Yes	--	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Supply</u>		<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
	<u>Inc.</u>	<u>Rear.</u>				
<u>Gnat Creek Hatchery</u>	N/A	S				
STS/24						
STW/13						

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15mg/L	Yes		
SS Effluent	All	e0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes		
pH	All	6.0-9.0	Yes		
Continuous Monitoring of Other Parameters	All	Yes	Yes		

Objective 6

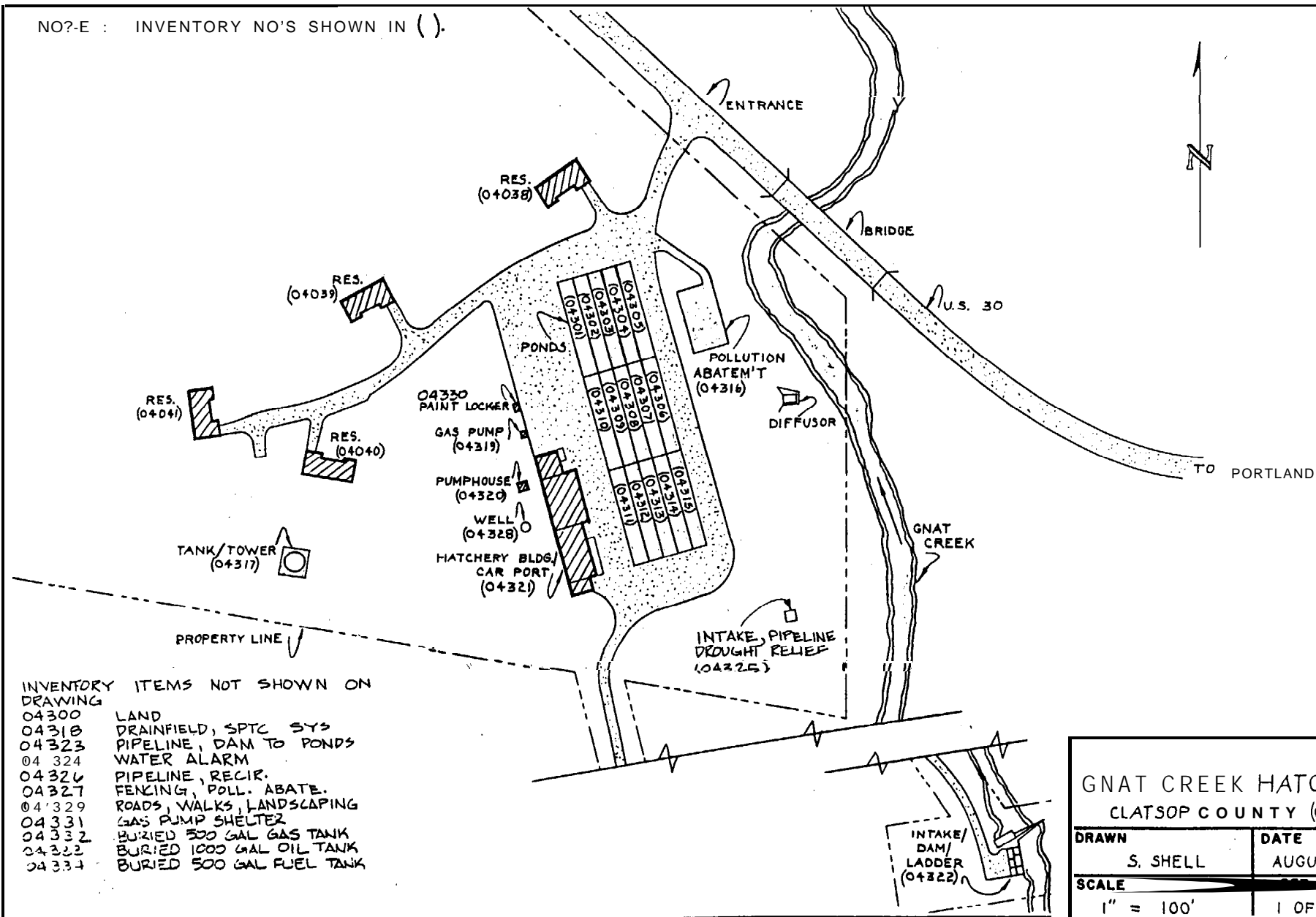
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Gnat Creek Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Inadequate water supplies in the summer and fall lead to rearing density concerns.
2. Oxygen supplementation is needed to significantly increase fish production, especially during periods of low water flow.

NO?E : INVENTORY NO'S SHOWN IN ().



INVENTORY ITEMS NOT SHOWN ON
DRAWING

04300	LAND
04318	DRAINFIELD, SPTC SYS
04323	PIPELINE, DAM TO PONDS
04324	WATER ALARM
04326	PIPELINE, RECIR.
04327	FENCING, POLL. ABATE.
04329	ROADS, WALKS, LANDSCAPING
04331	GAS PUMP SHELTER
04332	BURIED 500 GAL GAS TANK
04333	BURIED 1000 GAL OIL TANK
04334	BURIED 500 GAL FUEL TANK

GNAT CREEK HATCHERY CLATSOP COUNTY (04)

DRAWN	S. SHELL	DATE	AUGUST 1980
SCALE	1" = 100'	PAGE	1 OF 1

Irrigon Hatchery

INTRODUCTION

Irrigon Hatchery is located along the Columbia River above John Day Dam near Irrigon, Oregon. Elevation of the facility is 277 feet above sea level. The facility is staffed with 8 FTE's.

Facility rearing units include 32 raceways and 68 circular starting tanks, all in excellent condition. The hatchery water supply is provided from five wells which can deliver a total of approximately 21,000 gpm. Water rights and design capacity is about 25,000 gpm. The 21,000 gpm is available year round with actual low water use occurring in June when only 2,400 gpm is needed. Water flows from an upper series of raceways and is re-used in the lower series prior to discharge.

Rearing Facilities at Irrigon Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Circular Tanks	6	2,42	66		66	4,624	Fiberglass	9	Excellent	
Raceways	100	20	3,75	7,500	32	240,000	Concrete	9	Good	
Vertical Incubators					268		Fiberglass	9	Good	

PURPOSE

Irrigon Hatchery began operation in 1984 as part of the Lower Snake River Compensation Program (LSRCP)-a program to mitigate for spring chinook and summer steelhead losses caused by the four federal dams constructed on the lower Snake River. This facility serves as an egg incubation and rearing facility for summer steelhead destined for the Grande Ronde and Imnaha river systems. In addition, Irrigon is also used as a final rearing site for legal-sized rainbow trout destined for northeast Oregon waters.

GOALS

The LSRCP agreement is to produce up to 2,000 summer steelhead adults for in-place in-kind mitigation in the Imnaha River System and up to 9,184 adults for in-place in-kind mitigation in the Grande Ronde River System.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Produce 1,350,000 smolts (270,000 pounds) for release into the Grande Ronde River System.

Produce 330,000 smolts (66,000 pounds) for release into the Imnaha River System.

Rainbow Trout

Hold 60,000 legal-sized rainbow trout produced in central Oregon hatcheries for final distribution to northeast Oregon waters.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

There are no adult fish collected at Irrigon Hatchery. Eggs, fry or fingerlings are transferred in from other facilities as described below.

Wallowa Stock Summer Steelhead: Wallowa stock is used as the broodstock for hatchery releases into the Grande Ronde River System. Entry of adults into the subbasin occurs between early March and late May. Peak spawning occurs in April. Fish are collected and spawned at both the Wallowa Hatchery and the Big Canyon Acclimation Pond. Eggs are transferred to Wallowa Hatchery for eye-up and then transferred to Irrigon Hatchery for incubation and rearing.

Imnaha Stock Summer Steelhead: Entry of adults into the Imnaha River Subbasin occurs between early March and late May. Adults are collected and spawned at Little Sheep acclimation facility. Eggs are transferred to Wallowa Hatchery for eye-up and then transferred to Irrigon Hatchery for incubation and rearing.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

The Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future rearing and release

strategies for some fish stocks. Until these policies are fully implemented, the following interim practices are being used at Irrigon Hatchery:

Wallowa Stock Summer Steelhead: Rear 1,350,000 fish to size of 5 fish/pound at Irrigon Hatchery. Transfer 662,500 smolts to the Wallowa Hatchery acclimation ponds and 375,000 smolts to the Big Canyon acclimation facility. Acclimate smolts at these facilities for approximately four weeks and release during April and May. Directly release all remaining smolts in April as follows:

- 50,000 smolts into Deer Creek
- 200,000 smolts into the Upper Grande Ronde River
- 62,500 smolts into Catherine Creek

All fish are marked prior to release. A portion of the releases is also coded-wire tagged.

Imnaha Stock Summer Steelhead: Rear 330,000 fish to size of 5 fish/pound at Irrigon Hatchery. Transfer 230,000 to the Little Sheep Creek acclimation facility; acclimate for a minimum of three weeks; release in April and May. Directly release the remaining smolts into the Imnaha River (50,000 smolts in April) and Little Sheep Creek (50,000 smolts in May). All fish are marked prior to release. A portion of the releases is also coded-wire tagged.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Irrigon Hatchery:

Summer Steelhead: No spawning is conducted at Irrigon Hatchery. Broodstock selection and spawning occurs at Wallowa Hatchery and its satellite facilities (see Wallowa Hatchery Plan for additional information).

Objective 4: Maximize survival at all life stages using **disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.**

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in

the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.

- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Irrigon Hatchery

Health Monitoring

- Monthly fish health examinations are conducted on each lot of juvenile steelhead. A minimum of five healthy-appearing fish and a combination of ten moribund, fresh-dead or frozen fish (if available) are sampled per fish lot.
- Pretransfer and preliberation health examinations are conducted on all steelhead lots according to transfer or liberation strategies. These examinations are far more extensive than monthly monitoring, however, monthly monitoring protocols are included.
- Clinical examinations are made whenever increased losses or abnormal behavior are reported to or observed by fish health personnel. The examination results are used to recommend appropriate remedial or preventative measures.
- Clinical findings and results of monthly monitoring, pretransfer/preliminary examinations and loss investigation are reported on ODFW Fish Health Examination forms and in the Lower Snake River Compensation Plan monthly reports.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Fish and Egg Transfers

- Fish and egg transfers are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections.
- Formalin is dispensed into incubator, tank or raceway water influents to control fungus on eggs and juveniles, and for external parasite control on juveniles. The dosage, frequency and exposure time depends upon the species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration or those classified as “low regulatory priority” are used for treatments.

Sanitation

- All eggs transferred into the facility are surface-disinfected with iodophor.
- All equipment and personal rain gear are disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate incubator units, tanks, raceways and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

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- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

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- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*—records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
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In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

ODEW holds periodic meetings with the U.S. Fish and Wildlife Service and appropriate Indian tribes to discuss hatchery operations.

Communication with the General Public

Irrigon Hatchery receives approximately 4,000 annual visitors. The hatchery also conducts numerous tours to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-IRRIGON HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Adult Prespawning Survival	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Egg-take	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Green Egg-to-Fry Survival	Wallowa STS	95%	92.0%	84.7-98.3%	
	Imnaha STS	95%	90.0%	79.2-98.3%	
Fry-to-Smolt Survival	Wallowa STS	95%	89.0%	85.6-95.4%	
	Imnaha STS	95%	90.9%	83.9-93.9%	
Fish Releases	Wallowa STS	1,350,000	1,298,313	1,125K-1,407K	1
	Imnaha STS	333,000	336,268	278K-384K	
Egg Transfers.	Wallowa STS	0	N/A	N/A	
	Imnaha STS	0	N/A	N/A	
Fish Transfers	Wallowa STS	0	N/A	N/A	
	Imnaha STS	0	N/A	N/A	
	STW	45,000	-- ²	-- ²	
Adults Passed Upstream	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Percent Survival	Wallowa STS	0.68%	0.77%	0.20-1.41%	
	Imnaha STS	0.61%	0.56%	0.19-0.99%	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	Wallowa STS	5.0	4.9	3.9-6.1	1
	Imnaha STS	5.0	5.5	4.7-8.3	1
Acclimation	Wallowa STS	Yes	Yes	--	
	Imnaha STS	Yes	Yes	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Spawning Pop. >500	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	
Spawning Ratio Male:Female	Wallowa STS	N/A	N/A	N/A	
	Imnaha STS	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	Wallowa STS	Yes	Yes	--	
	Imnaha STS	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Irrigon Hatchery</u>	G	G				
CHF/95						
STS/29						
STS/56						
STW/50						

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	a5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

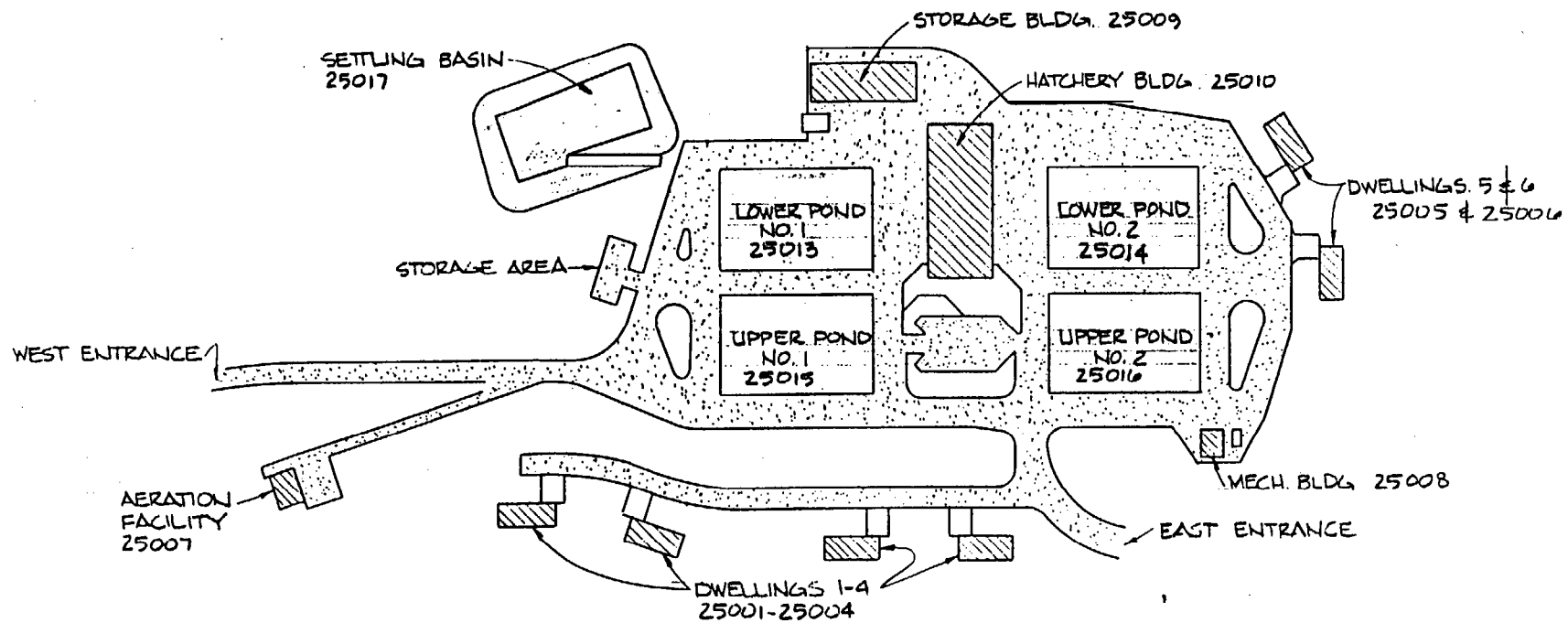
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constrain M/Comments-Irrigon Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

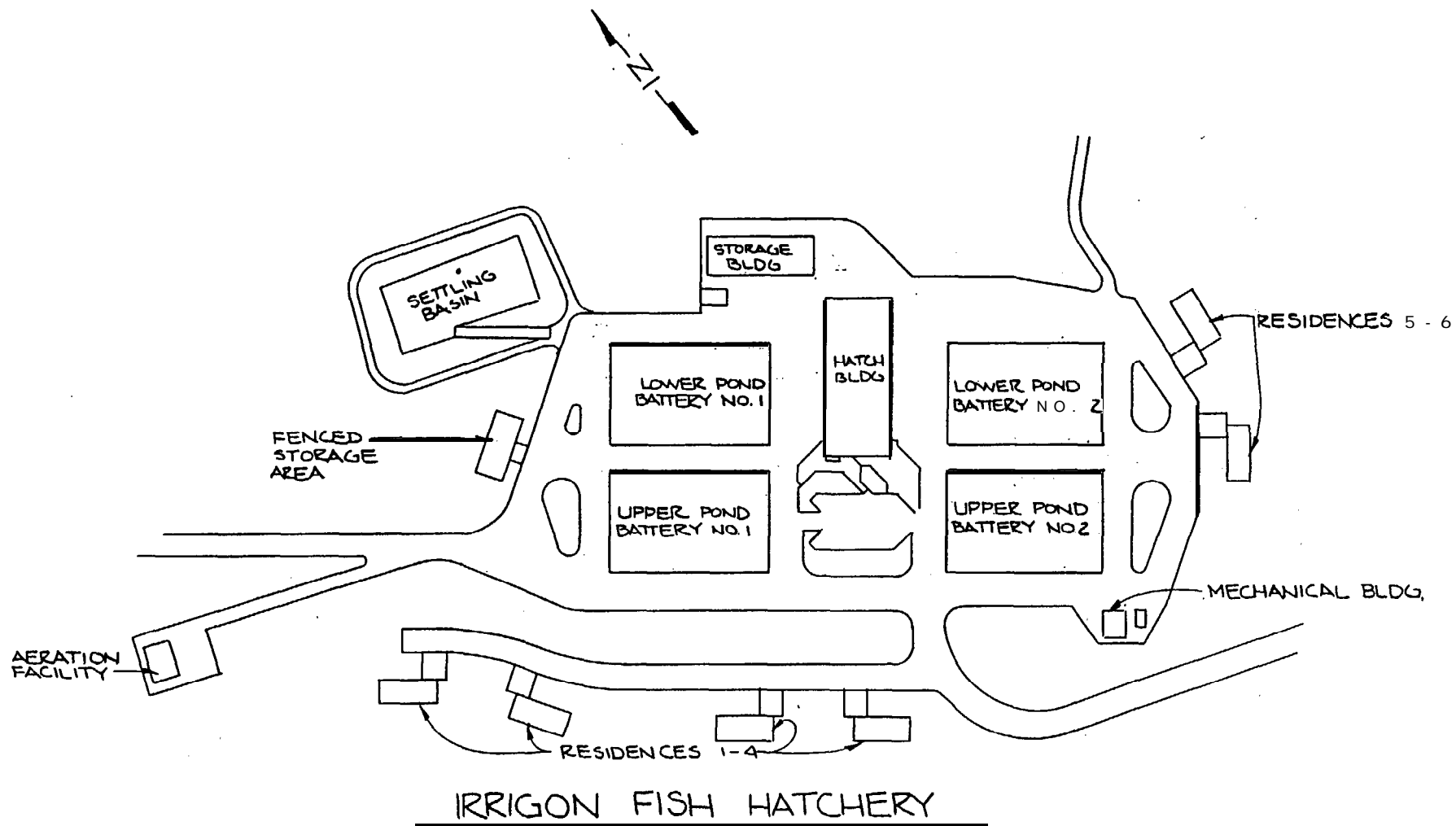
1. The primary source of water for the hatchery is wells which have flows that fluctuate depending upon the Columbia River water levels. During low water flows, the fish must be transferred to other facilities earlier than programmed, which may not be beneficial to program goals.



SITE, POLES, CURBS, ETC. - 25018

LAND, PAVING, ROADS - 25018

IRRIGON HATCHERY



Klaskanine Hatchery

INTRODUCTION

Klaskanine Hatchery is located along the North Fork Klaskanine River approximately 12 miles southeast of Astoria, Oregon. Site elevation is about 25 feet above sea level.

Rearing facilities consist of 17 raceways and 1 concrete rearing pond. There are also 19 rearing troughs and 40 single-stack egg incubators located inside the hatchery building. The rearing facilities and main water supply lines are in poor, deteriorating condition. The facility is staffed with 4.75 FTE's.

Water is supplied by gravity flow and from three intakes located on the North Fork Klaskanine River and North Fork of the North Fork River. The current water right is for 22,442 gpm (50 cfs) although the maximum water usage is 11,000 gpm. Summer/fall water flows are a limiting factor and the hatchery utilizes the entire flow available from the river during this period (about 1,000 gpm). The water delivery system limits the amount of water that can be supplied during high flows.

Water is reused in raceways from the large rearing pond during low flow periods. Recirculation pumps also are used in the large rearing pond during this period.

Rearing Facilities at Klaskanine Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Raceways	150	16	2.5	6,000	1	6,000	Concrete	36	Fair	
Raceways	80	20	3	4,800	16	76,800	Concrete	44	Good	Bottoms replaced, 8 ponds, 1985
Rearing Ponds			7	210,000	1	210,000	Asphalt	14	Good	0.75 acre pond
Troughs					19		Wood	36	Poor	
Vertical Incubators					320		Plastic	10	Good	

PURPOSE

incubation and rearing of coho. It also serves as an egg incubation facility for fall chinook and a rearing facility for winter steelhead.

GOALS

Coho and Fall Chinook: Produce lower river fall chinook and coho that will contribute to NE Pacific and Columbia River basin commercial and sport fisheries while providing adequate escapement for hatchery production.

Winter Steelhead: Create a consumptive, winter steelhead fishery in the Klaskanine River.

OBJECTIVES

Objective 1: Hatchery Production

Fall Chinook

Incubate and hatch 2,945,000 eggs for Big Creek Hatchery (fry are transferred back to Big Creek Hatchery).

Coho

Produce 1,125,000 smolts (93,750 pounds) for on-station release.

Provide 600,000 green coho eggs to the Clatsop Economic Development Commission when needed.

Provide 20,000 eyed eggs to Oregon's Salmon and Trout Enhancement Program.

Winter Steelhead

Produce 60,000 smolts (12,000 pounds) for on-station release.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Tule Fall Chinook: Adults arrive in the **subbasin** from late August through mid-October. Few fall chinook are collected at this facility because of low river flows during the time they return. Eggs are received from Big Creek Hatchery.

Coho: of adults into the **subbasin** occurs from early September to November. Spawning occurs from October to December with a peak usually in late October. Adults are collected at the hatchery.

Winter Steelhead: Adult winter steelhead are not usually collected at this facility; fingerlings are received from Big Creek Hatchery. On occasion, some adults are collected as a backup to the Big Creek Hatchery program.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Tule Fall Chinook: Transfer eyed eggs from Big Creek Hatchery for incubation; rear 3,200,000 fish to a swim-up stage and transfer back to Big Creek Hatchery in January.

Coho: Rear 1,125,000 smolts to a size of 12 fish/pound; acclimate and release on-station in early April. Mark and tag (CWT) a portion of the release.

Winter Steelhead: Transfer fingerlings from Big Creek Hatchery in December; rear 60,000 fish to a size of 5 fish/pound; rear and release on-station in mid-April. All fish are fin marked at Big Creek Hatchery prior to transfer.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policy are fully implemented, the following interim practices are currently being used at Klaskanine Hatchery:

Tule Fall Chinook: No fall chinook are spawned at this facility. Fall chinook eggs are received from Big Creek Hatchery (Big Creek stock).

Chhentire run is comprised of hatchery fish. The interim practice is to collect adults throughout the entire run and maintain a 1:2 male to female spawning ratio.

Only Klaskanine coho are used for broodstock. Big Creek coho stock is used in years with low adult returns.

Winter Steelhead: No steelhead are spawned at this facility. Eggs are received from, Big Creek Hatchery (Big Creek stock).

Objective 4: Maximize survival at all life stages using disease control and' disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.

- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Klaskanine Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.

- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections. Oxytetracycline is administered in August and September to prevent botulism.
- Formalin is dispensed into water for control of parasites and fungus on eggs and juveniles. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*-measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production-goals for all public hatcheries in Oregon. These

meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*—records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*—document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It

is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon *Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Klaskanine Hatchery receives approximately 5,000 annual visitors. The hatchery conducts numerous tours to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities. The hatchery also provides two local high school classes the opportunity to participate in the annual coho spawning operations. Eggs from the Salmon and Trout Enhancement Program are reared in the classroom at these two schools. Klaskanine Hatchery has also provided the opportunity for new NMFS law enforcement recruits to learn about fish culture techniques.

PERFORMANCE STANDARDS—KLASKANINE HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHF	--	28	8-67	2
	COH	3,360	3,374	739-6,099	2
	STW	--	420	319-666	
Adult Prespawning Survival	CHF	--	54.0% ²	37.5-68.6%	2
	COH	95%	87.8%	76.4-92.8%	
	STW	--	99.8%	98.7-100%	
Egg-take	CHF	0 ³	28,251 ²	12K-135K	
	COH	1534,000	1,626,919	754K-2,915K	
	STW	--	516,563	309K-699K	
Green Egg-to-Fry Survival	CHF	--	N/A	N/A	1,2,5
	COH	95%	90.9%	86.5-94.8%	1,2,5
	STW	--	N/A	N/A	
Fry-to-Smolt Survival	CHF	95%	89.2% ²	82.3-97.4%	2,3
	COH	95%	75.0%	55.4-91.4%	
	STW	95%	88.6%	85.2-91.0%	
Fish Releases	CHF	N/A	2,783,368 ⁴	N/A	
	COH	1,125,000	1,071,131	832K-1,395K	
	STW	60,000	53,445	41 K-60K	
Egg Transfers	CHF	N/A	-- ⁵	-- ⁴	
	COH	620,000	-- ⁴	-- ⁴	
	STW	0	-- ⁴	-- ⁴	
Fish Transfers	CHF	2,897,000	-- ⁴	-- ⁴	
	COH	0	-- ⁴	-- ⁴	
	STW	0	-- ⁴	-- ⁴	
Adults Passed Upstream	CHF	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
	STW	N/A	261	184-408	
Percent Survival	CHF	N/A	0.08% ⁶	0.01-0.15%	
	COH	N/A	2.73%	0.37-4.80%	
	STW	N/A	Unknown	Unknown	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Two year average.

³ Fall chinook egg-take program discontinued in 1992.

⁴ One year only.

⁵ Not estimated for this report.

⁶ Data for only three years.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHF	N/A	58.3 ²	N/A	
	COH	12.0	12.6	11.3-13.7	
	STW	5.0	5.6	4.7-6.1	
Acclimation	CHF	N/A	N/A	N/A	
	COH	Yes	--		
	STW	Yes	--		

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHF	N/A	N/A	N/A	
	COH	Yes	Yes	--	2
	STW	Yes	Yes	--	2
Spawning Pop. >500	CHF	N/A	N/A	--	
	COH	Yes	Yes	--	
	STW	No	No	--	
Spawning Ratio	CHF	N/A	N/A		
Male:Female	COH	1:2	Yes	--	
	STW	N/A	N/A	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHF	Yes	Yes	--	
	COH	Yes	Yes	--	
	STW	Yes	Yes	--	

History of Reportable Pathogens-I 1990- 1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc/ERM</u>	<u>Other/Comments</u>
<u>Klaskanine Hatchery</u>	S	S				
COH/15				+		EIBS
STW/13				+		

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4 5 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments—Klaskanine Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Water turbidity is sometimes a problem.
2. Low water flows during the summer months have contributed to fish losses. Low flows also cause overcrowding and limit egg incubation and rearing potential.
3. Oxygen supplementation is needed to significantly increase fish production, especially during low water flow periods.
4. The concrete rearing lake design makes it difficult to obtain accurate fish release figures.
5. The egg incubation system needs to be upgraded.
6. Lack of funding over the past decade has created a serious deferred maintenance and equipment backlog.

Leaburg Hatchery

INTRODUCTION

Leaburg Hatchery is located along the McKenzie River (Willamette Basin) approximately 23 miles east of Springfield, Oregon. Site elevation is 740 feet above sea level. The facility is staffed with 7.5 FTE's.

Facility production units include 40 concrete raceways of 7,320 cubic feet each, 1 concrete raceways of 3,660 cubic feet, 6 concrete circular ponds, 20 aluminum incubation troughs, and 13 Canadian-style troughs used as starting tanks. Two of the raceways are used for adult capture and holding. Only four raceways are used to rear anadromous fish; the remaining facilities are utilized for the resident trout program.

Water rights total 56,100 gpm from the McKenzie River. Water use varies with need throughout the year and is delivered by gravity. All rearing facilities use single-pass water.

Rearing Facilities at Leaburg Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Canadian Troughs	16	2.66	1.5	64	13	832	Fiberglass	8	Excellent	
Canadian Troughs	21	2.66	1.5	84	4	336	Fiberglass	8	Excellent	
Circular Ponds		20	2.2	690	6	4,140	Concrete	42	Good	
Raceways	50	20	3.66	3,660	3	10,980	Concrete	42	Good	1 for adult holding
Raceways	100	20	3.66	7,320	39	285,480	Concrete	42	Good	1 for adult capture
Troughs	18	1.17	.5	11	5	211	Aluminum	25	Good	
Vertical Incubators					48		Plastic	5	Excellent	6 half stacks

PURPOSE

Leaburg Hatchery was constructed in 1953 by the U.S. Army Corps of Engineers (COE) to mitigate for lost trout habitat caused by construction of Blue River and Cougar dams and other Willamette Valley projects. The hatchery is used for egg incubation and rearing of summer steelhead and cutthroat trout, and for rearing trout.

GOALS

Summer Steelhead: Help achieve the McKenzie River Subbasin Plan's objective to provide an average sport catch of 1,200 adult summer steelhead in the McKenzie River.

Trout: The COE mitigation agreement requires the annual production of no more than 277,000 pounds of trout.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Produce 108,000 smolts (24,000 pounds) for release into the McKenzie River.

Produce 115,500 smolts (11,550 pounds) for transfer to Dexter Hatchery.

Rainbow Trout

Produce 723,900 legal-sized trout (241,300 pounds) for release into reservoirs, streams and standing water bodies in the Willamette River Basin.

Cutthroat Trout

Produce 95,000 fingerlings (365 pounds) for transfer to Fall River Hatchery for the Cascade High Lakes airstocking program.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Summer steelhead adults arrive in the McKenzie River from April through December. Spawning occurs from late February through mid-March. Adults are collected at **Leaburg** Hatchery and at McKenzie Hatchery. All adults are held for spawning at **Leaburg** Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used

to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Summer Steelhead: Rear 108,000 fish to a size of 4.5 fish/pound; release 27,000 on-station and truck 81,000 for release into the McKenzie River in mid-April. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at **Leaburg** Hatchery:

Summer Steelhead: Adult summer steelhead are collected from May through October to maintain a broad run timing and are spawned at 1:1 male-to-female ratio. In times of inadequate fish returns to the McKenzie River, summer steelhead from the Middle Fork Willamette River (Dexter Dam) or the South **Santiam** River (Foster Dam) are used for broodstock, in that order of preference.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks..

ODFW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.

- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Leaburg Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each fish lot. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult summer steelhead are injected with antibiotics for the control of bacterial diseases. Brood cutthroat trout are vaccinated for furunculosis and administered antibiotics orally as needed for the control of bacterial infections.
- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.

- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult steelhead and brood cutthroat trout. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor. Currently no eggs are brought to this facility.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities’ to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.

- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)* measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Poned Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*—details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.

- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

ODEW staff meets frequently with Eugene Water and Electric to discuss hatchery operations.

Communication with the General Public

Leaburg Hatchery receives approximately 80,000 visitors each year. The hatchery also conducts numerous tours to school and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-LEABURG HATCHERY.

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	STS	200	350	131-527	3,4
Adult Prespawning Survival	STS	95%	82%	72.6-91.5%	3,4
Egg-take	STS	368,000	368,047	231 K-542K	4
Green Egg-to-Fry Survival	STS	95%	76.9%	48.3-83.7%	4,6
Fry-to-Smolt Survival	STS	95%	82.0%	43.0-95.9%	6
Fish Releases	STS	108,000	107,618	95K-113K	
Egg Transfers	STS	300,000	-- ²	-- ²	6
Fish Transfers	STS	115,500	106,502	83K-120K	6
Adults Passed Upstream	STS	N/A	N/A	N/A	
Percent Survival	STS	N/A	Unknown	Unknown	4,5,6

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STS	4.5 ³	4.7	4.4-5.1	
Acclimation	STS	Yes	Yes	--	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ Goal changed from 5.0 to 4.5 fish/pound in 1992.

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	STS	No	No	--	3,4
Spawning Pop. >500	STS	Yes	No	--	
Spawning Ratio Male:Female	STS	1:1	No		

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	STS	Yes	Yes	--	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Leaburg Hatchery</u>	S	S				
CT/59					+	No longer reared
CT/64					+	No longer reared
CT/I 19			NEV		+	Vaccinated for furunc.
RB/57						CWD No longer reared
RB/72			IHN			CWD IHN in fingerling & adults
STS/23			IHN	+		CWD IHN in adults

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes		
SS Effluent	All	<0.1 ml/L	Yes		
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

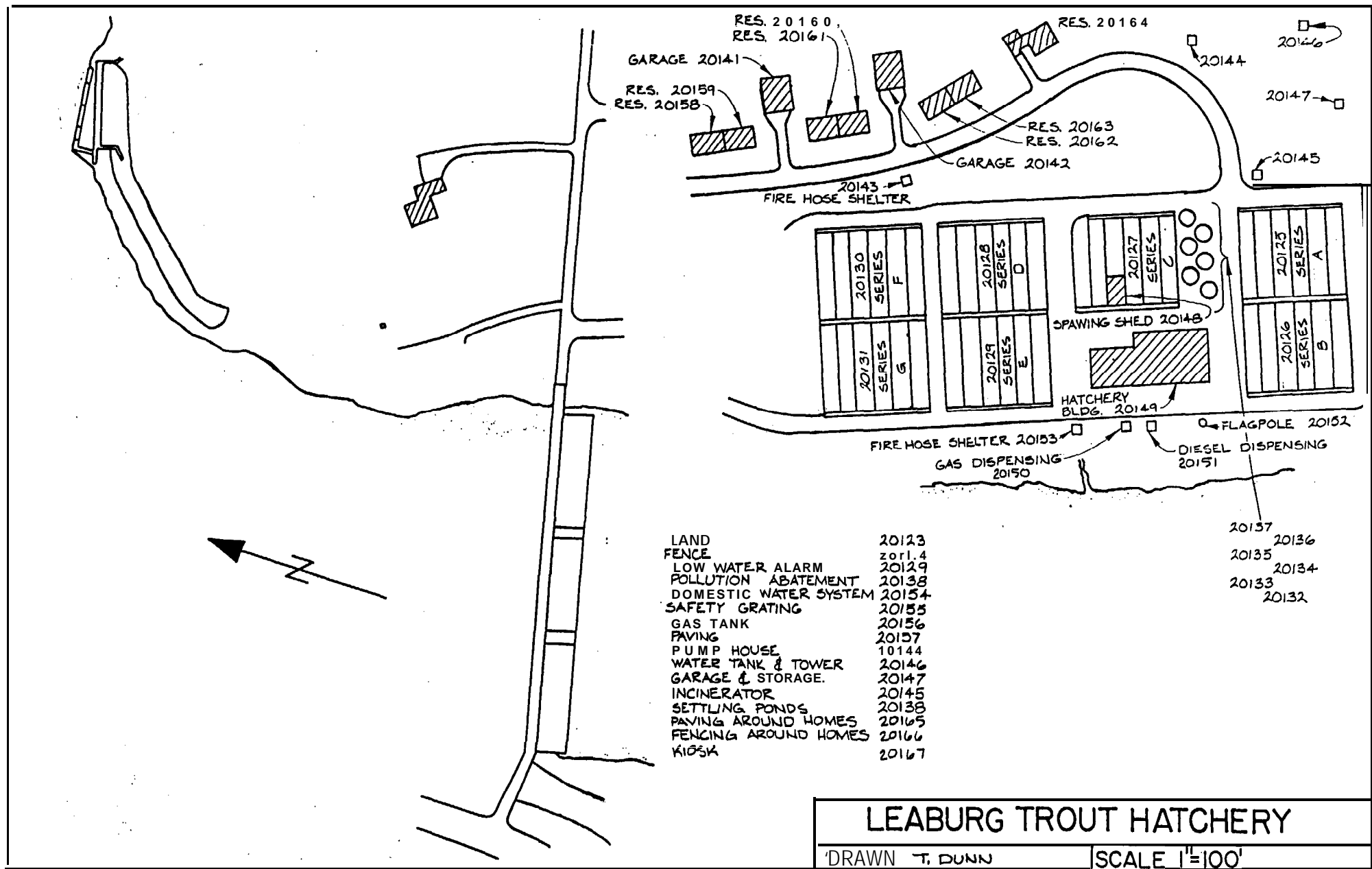
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Leaburg Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Need self-cleaning screens of appropriate size to meet statewide standards at the hatchery water intake.
2. Design of the effluent abatement system is inadequate to achieve maximum cleaning potential.
3. An adult holding pond for summer steelhead is needed.
4. Hatchery has no good adult collection facility; it must **rely on** McKenzie Hatchery to obtain most of the adults needed for spawning.
5. Potential fish losses caused by fish entering an unscreened water canal used for hydropower generation (Walterville Canal).
6. No assured clean water source for egg incubation and early rearing.



Lookingglass Hatchery and Satellite (Imnaha)

INTRODUCTION

Lookingglass Hatchery is located along Lookingglass Creek, a Grande Ronde River tributary located approximately 2 miles north of Palmer Junction in northeast Oregon at an elevation of 2550 feet above sea level.. The hatchery began production in 1982. Currently the rearing units are in excellent condition and include 18 raceways, 2 adult holding ponds and 32 Canadian-style starting troughs. The facility is staffed with 5.75 FTE's.

Water rights for the hatchery total 38,782 gpm from Lookingglass Creek and wells. Water rights for Lookingglass Creek include 22,442 gpm for fish propagation and an additional 13,462 gpm for operation of a fishway constructed prior to the hatchery. Water flows equal to the water rights are available year round but are not needed at all times. Freezing of the intake and water supply is a problem during the winter. Well water is used to temper creek water and prevent raceways and intake from filling with slush ice.

The Imnaha Acclimation Pond is operated as a satellite of Lookingglass Hatchery. It is located along the middle section of the Imnaha River at an elevation of 3,760 feet above sea level. The facility, which was completed in 1988, consists of a single acclimation/holding pond of approximately 12,655 cubic feet. It is staffed with 0.5 FTE.

Rearing Facilities at Lookingglass Hatchery and Satellite

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
<u>Lookingglass</u>										
Adult Holding Ponds	76	20	3	4,560	2	9,120	Concrete	12	Good	
Raceways	100	10	3	3,000	16	54,000	Concrete	12	Good	
Starter Troughs	21	2.5	1.5	79	32	2,520	Fiberglass	12	Good	
Vertical Incubators					266		Fiberglass	12	Good	
<u>Imnaha Pond</u>										
Acclimation Pond	125	26	4	13,000	1	13,000	Concrete	6	Good	Acclimation/Adult Holding

PURPOSE

Lookingglass Hatchery was constructed in 1982 as part of the Lower Snake River Compensation Plan (LSRCP)-a program to mitigate for spring chinook and summer steelhead losses caused by the four federal dams constructed on the lower Snake River. Lookingglass is used to raise spring chinook for the Grande Ronde and Imnaha rivers as part of LSRCP.

Lookingglass Hatchery serves as an adult collection, egg incubation, rearing and release site for the spring chinook destined for the Grande Ronde River and the Imnaha River systems. The Imnaha Acclimation Pond is used for the collection of spring chinook adults returning to the Imnaha River. Eggs are incubated and juveniles reared at Lookingglass Hatchery. Fish are then transferred back to the Imnaha facility for acclimation and release.

GOALS

Grande Ronde River System: Produce up to 5,820 spring chinook adults for in-place, in-kind mitigation.

Imnaha River System: Produce up to 3,210 spring chinook adults for in-place, in-kind mitigation.

OBJECTIVES

Objective 1: Hatchery Production

Produce up to 900,000 spring chinook smolts (48,335 pounds) for on-station release.

Produce up to 490,000 spring chinook smolts (19,470 pounds) for release from the Imnaha Acclimation Pond.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

- Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Rapid River Stock Spring Chinook: Rapid River broodstock was recently approved as the broodstock for spring chinook releases in the Grande Ronde River system. Entry of spring chinook adults into the Grande Ronde occurs from mid-May through July. Peak spawning occurs from mid-May to mid-September. Adults are captured and spawned at Lookingglass Hatchery.

Imnaha Stock Spring Chinook: Entry of adults into the Imnaha River occurs from mid-May through July. Peak spawning occurs from mid-August to mid-September. Adults are collected at the Imnaha Acclimation Pond and are transferred to Lookingglass Hatchery and held to maturation and spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which is intended to reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to induce homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Rapid River Stock Spring Chinook: Rear 900,000 fish to a size of 20 fish/pound, acclimate to parent river water and release at the hatchery in April. All fish are marked prior to release.

Imnaha Stock Spring Chinook: Rear 490,000 fish at Lookingglass Hatchery and transfer to the Imnaha Acclimation Pond in March. Acclimate 390,000 fish for a minimum of four weeks and then release into the Imnaha River in April and make a direct stream release of 100,000 fish at a size of 15-25 fish/pound. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Lookingglass Hatchery:

Rapid River Stock Spring Chinook: The interim practice is to collect adults throughout the entire run. Due to low numbers of returning adults, all adults are collected for hatchery purposes. The major component of the run is comprised of hatchery fish. Adults are spawned at a 1:1 male-to-female ratio or during very low run size years a matrix spawning procedure is implemented.

Imnaha Stock Spring Chinook: The interim practice is to collect wild and hatchery adults throughout the entire run. No more than 33 percent of the wild run is captured for hatchery use; the remaining 67 percent is allowed to pass above the collection facility. No more than 60 percent of the hatchery adults are collected and

40 percent are passed upstream. Adults are spawned at a 1:1 ratio or during very low run size years a matrix spawning procedure is implemented.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.

- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Lookingglass Hatchery and Satellite

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each spring chinook lot. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot. Results are reported on the ODFW Fish Examination form and the Lower Snake Compensation Plan monthly report.
- At spawning, a minimum of 60 ovarian fluids and 60 **kidney/spleen/pyloric caeca** (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. Necropsies on all prespawning mortality (up to 20 fish) are conducted for bacteria, parasites and other causes of death. Additional examinations are conducted if mortality exceeds normal levels.
- Prior to transfer or release, fish are given a health exam. This exam includes aspects of the preceding monthly monitoring exam. Results are reported on ODFW Fish Examination forms and in the Lower Snake River Compensation Plan monthly report.

- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics for the control of bacterial diseases.
- Eggs are spawned into colanders to remove ovarian fluid, fertilized, and then water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and disease being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All freshly fertilized eggs taken at Lookingglass Hatchery are water-hardened in iodophor. Eggs are fertilized, rinsed and water-hardened in well water.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*—changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These

meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*—records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*—details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*—records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*--some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It

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In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. *v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Periodic meetings are held with the U.S. Fish and Wildlife Service and appropriate Indian tribes to discuss hatchery operations.

Communication with the General Public

Lookingglass Hatchery receives approximately 3,000 visitors per year. The hatchery also conducts numerous tours to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-LOOKINGGLASS HATCHERY AND SATELLITE

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	Rapid R. CHS Imnaha CHS	592 264	602 631	222-I ,020 163-I ,243	5,7 7,10
Adult Prespawning Survival	Rapid R. CHS Imnaha CHS	95% 95%	96.6% 93.1%	87.4-97.9% 83.7-98.6%	6 11
Egg-take	Rapid R. CHS Imnaha CHS	1,125,000 560,000	842,434 444,136	171 K-I ,353K 193K-1,047K	7
Green Egg-to-Fry Survival	Rapid R. CHS Imnaha CHS	95% 95%	08.0% 92.2%	96.3-99.2% 83.0-98.3%	4,6 4,6
Fry-to-Smolt Survival	Rapid R. CHS Imnaha CHS	95% 95%	96.5% 97.4%	94.4-98.2% 94.7-99.9%	4,6
Fish Releases	Rapid R. CHS Imnaha CHS	900,000 490,000	702,378 395,014	349K-951K 259K-714K	1-8
Egg Transfers	Rapid R. CHS Imnaha CHS	0 0	$\frac{2}{-2}$ $\frac{2}{-2}$	$\frac{2}{-2}$ $\frac{2}{-2}$	
Fish Transfers	Rapid R. CHS Imnaha CHS	0 0	$\frac{2}{-2}$ $\frac{2}{-2}$	$\frac{2}{-2}$ $\frac{2}{-2}$	
Adults Passed Upstream	Rapid R. CHS Imnaha CHS	66% Wild 40% Hatchery	140 ³ 350	112-476 102-825	
Percent Survival	Rapid R. CHS Imnaha CHS	0.65% 0.65%	0.14% ⁴ 0.21%	0.04-0.35% 0.12-0.37%	4-8 4-8,11

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ Three years of data.

⁴ Four years of data.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	Rapid R. CHS Imnaha CHS	20 15-25	17.3 19.9	12.2-20.6 11.0-24.0	3,4,6 1,2
Acclimation	Rapid R. CHS Imnaha CHS	Yes Yes	Yes Yes	-- --	Imnaha 2,11

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	Rapid R. CHS Imnaha CHS	Yes Yes	Yes Yes	-- --	5
Spawning Pop. >500	Rapid R. CHS Imnaha CHS	Yes Yes	No No	-- --	7
Spawning Ratio	Rapid R. CHS	1:1 ¹	Yes	--	
Male:Female	Imnaha CHS	1:1 ¹	Yes	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	Rapid R. CHS Imnaha CHS	Yes Yes	Yes Yes	-- --	6

¹ Matrix spawning is used during low run sizes.

History of Reportable Pathogens-1990-1995.

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Lookingglass Hatchery</u> G		S				
CHS/29			IHN	+		EIBS IHN in adults
CHS/81				+		
CHS/85			IHN	+		EIBS IHN in smolts and adults
<u>Imnaha</u>						
CHS/29	N/A	S	IHN	+		EIBS IHN in smolts and adults

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

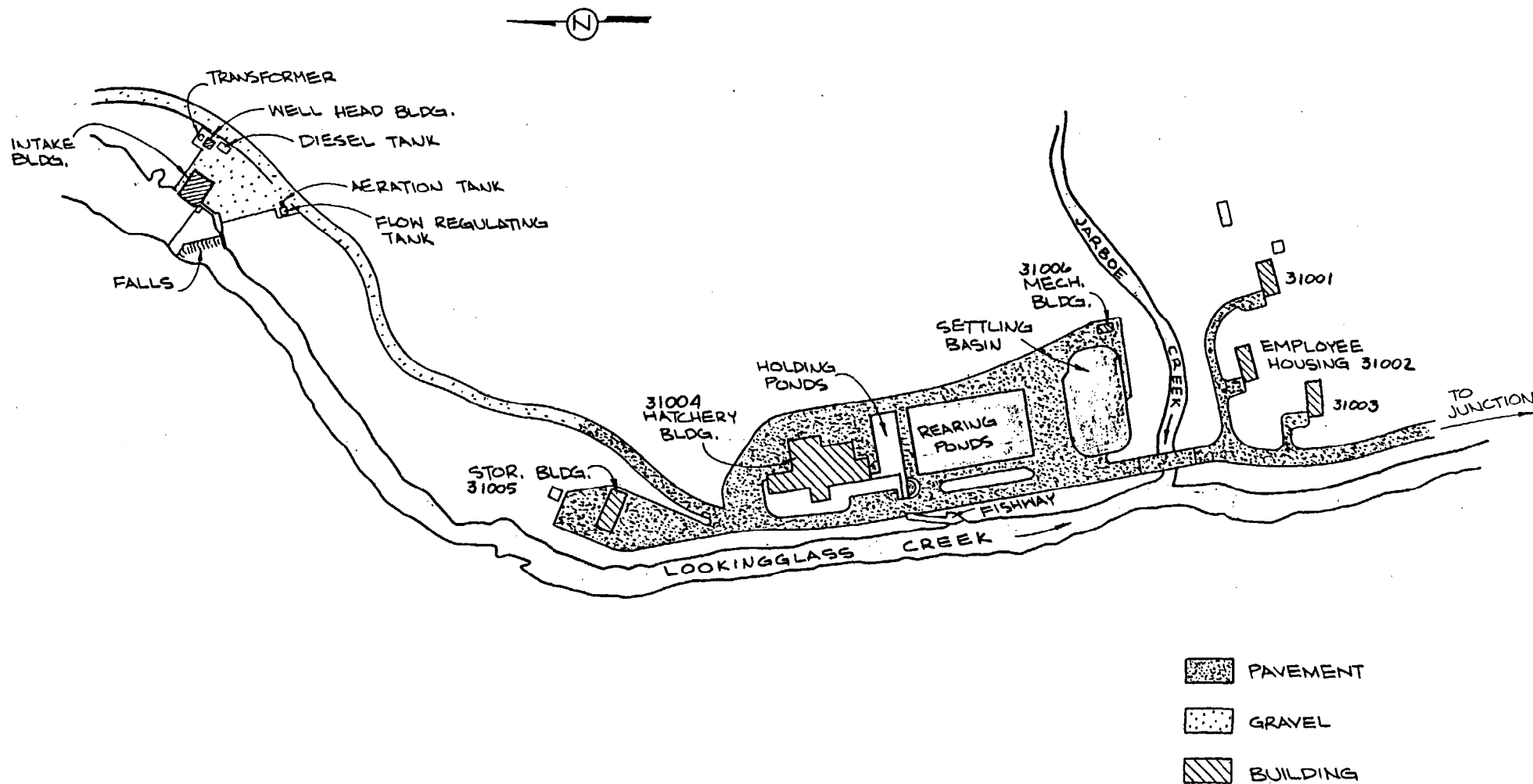
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Lookingglass Hatchery and Satellite

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

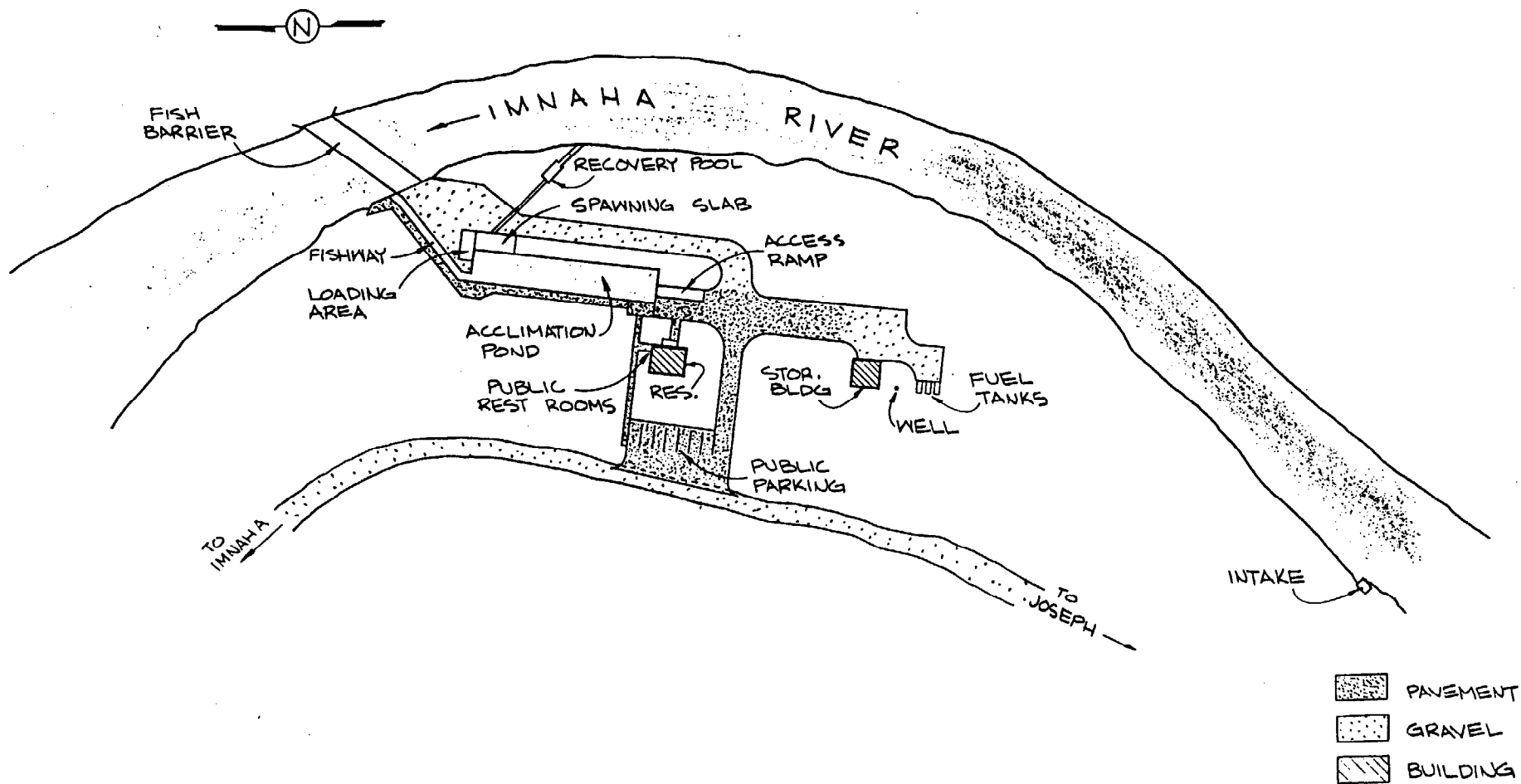
1. Ice at Lookingglass Creek intake threatens the water supply during cold periods in the winter.
2. Cold water temperatures limit fish growth in winter and early spring.
3. Raceway walls are not high enough to allow loading of designed rearing densities. Fish are able to jump over the raceway walls.
4. Lack of chilled well water for early rearing.
5. Seasonal drought periods cause a decrease in the availability of creek water.
6. Passage of adults above the intake results in disease outbreaks in juveniles and adults.
7. Operating under the constraints of the wild fish policy and Endangered Species Act.
8. Design of intake system does not allow the ability to dewater the intake for maintenance or repairs without shutting off the water to the facility.
9. During emergency situations, the juvenile fish could get mixed among raceways via access through the main water supply pipeline.
10. Extreme erosion on the North Fork of the Imnaha River causes heavy flows of silt after rain storms.
11. Ice at the Imnaha facility threatens the water supply.



LOOKINGGLASS CREEK HATCHERY

APRIL, 1987

SHEET 1 of 1



IMNAHA SATELLITE FACILITIES

MAY, 1987

SHEET 1 OF 1

Marion Forks Hatchery and Satellite (Minto Pond)

INTRODUCTION

Marion Forks Hatchery is located along Marion and Horn creeks (Santiam River tributaries in the Willamette Basin) about 17 miles east of Detroit, Oregon. Site elevation is 2,580 feet above sea level. The facility is staffed with 4.8 FTE's.

Rearing facilities are in good condition and include 8 raceways, 48 circular ponds and 12 Canadian-style starting troughs. There are two water rights: 15,257 gpm from Marion Creek and 14,368 gpm from Horn Creek. Water is supplied from Marion Creek from April through September, and from Horn Creek from October through March. All rearing units use single-pass water.

Minto Pond, located 33 miles downstream of the hatchery, is operated as a satellite facility. There is one water right for 26,940 gpm from the North Santiam River to operate this facility.

Rearing Facilities at Marion Forks Hatchery and Satellite

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Aoe	Condition	Comment
Marion Forks										
Canadian Troughs	21	2.67	1.75	98	12	1,176	Fiberglass	9	Good	
Circular Ponds		24	2.16	980	48	47,040	Concrete	44	Good	
Raceways	80	20	2.5	4,000	8	32,000	Concrete	44	Good	
Vertical Incubators					288		Plastic	9	Excellent	
Minto Pond										
Adult Holding/ Acclimation Pond	164	32	6	31,408	1	31,468	Concrete	20	Good	

PURPOSE

Marion Forks Hatchery began operation in 1951. The U.S. Army Corps of Engineers (COE) funds the majority of operational costs as mitigation for the development of Detroit and Big Cliff dams. The hatchery is used for egg incubation and rearing of spring chinook and winter steelhead (adult collection and spawning occurs at Minto Pond). The hatchery is also used as a rearing facility for cutthroat trout.

GOALS

The COE mitigation agreement requires the annual production of no more than 84,000 pounds of juvenile chinook and steelhead to mitigate for hydroelectric development in the North Santiam River. The Santiam Basin plan harvest objective for the mainstem and North Fork Santiam River is to provide a catch of 330 hatchery adult winter steelhead.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Produce 100,000 fry (500 pounds) for release into Detroit Reservoir.

Produce 667,000 smolts (60,636 pounds) for release into the North Santiam River.

Transfer 325,000 fry to McKenzie Hatchery.

Rear 580,000 fingerlings for transfer to South Santiam Hatchery.

Rear 365,000 smolts (18,250 pounds) for transfer to Clackamas Hatchery.

Winter Steelhead

Produce 100,000 smolts (20,006 pounds) for release into the North Santiam River.

Provide 25,500 eggs to Oregon's Salmon and Trout Enhancement Program.

Cutthroat Trout

Rear 68,000 fingerlings (454 pounds) for transfer to Fall River Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

- Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: Adults begin arriving in the Santiam River in mid-May. Adults are collected and held for spawning at the Minto Pond trap beginning in late August. Peak spawning occurs from mid to late September.

Winter Steelhead: Adults are collected and held for spawning at the **Minto** Pond trap beginning in early April. Peak spawning occurs from late April through early May.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Spring Chinook: Rear 667,000 fish to a size of 11 fish/pound. Transfer 333,500 to Minto Pond for acclimation and release into the North Santiam River in March. Truck the remaining 333,500 fish for an off-station release into the North Santiam River in March. Portions of both groups are marked to compare acclimated vs. nonacclimated release strategies.

The spring chinook program at Marion Forks Hatchery also includes rearing 100,000 fish to a size of 200 fish/pound and releasing them into Detroit Reservoir (North Santiam River System) in early June.

Winter Steelhead: Rear 100,000 fish to a size of 5 fish/pound. Transfer 50,000 to Minto Pond, acclimate for one month and release into North Santiam River in early April. Truck the remaining 50,000 fish for an off-station release into the North Santiam River in early April. All steelhead are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Marion Forks Hatchery:

Spring Chinook: The Minto Pond trap is opened in August and adults are collected throughout the run until early October. The adults collected include both wild and hatchery fish (the largest portion is probably hatchery fish). Adults are spawned at a 1:1 male-to-female ratio. Only North Santiam spring chinook are used for broodstock.

Winter Steelhead: The Minto Pond trap is opened in mid-April and adults are collected through mid-May. Both wild and hatchery fish are collected. Approximately 30 percent of the fish used for spawning are wild fish. Spawning is conducted using a 5X5 matrix process which involves 25 family groups. Only North Santiam winter steelhead are used for broodstock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.

- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Marion Forks Hatchery and Satellite

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon and steelhead lot. If prespawning is above normal, necropsies are conducted to identify bacteria, parasites and other causes of death.
- Fish are given health exam prior to transfer or release. This exam may be in conjunction with the routine monthly visit.

- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- A small percentage of adult spring chinook is injected with antibiotics for the control of bacterial diseases. Adult winter steelhead are not injected.
- At spawning, eggs are water-hardened in iodophor for disinfection and then transported to Marion Forks Hatchery.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

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Communication with the General Public

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PERFORMANCE STANDARDS-MARION FORKS HATCHERY AND SATELLITE

Objective 1

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Adult Capture	CHS	476	1,882	683-2,894	a
	STW	355	196	22-350	a
Adult Prespawning Survival	CHS	95%	84.6%	71 .o-92.0%	12
	STW	95%	98.0%	95.1-100%	
Egg-take	CHS	952,000	1,448,875	862K-2,462K	3
	STW	325,000	31 1,a92	44K-421K	
Green Egg-to-Fry Survival	CHS	95%	al .a%	73.1-92.5%	
	STW	95%	66.0%	36.0-87.1%	
Fry-to-Smolt Survival	CHS	95%	88.8%	80.7-96.7%	13
	STW	95%	78.3%	58.6-89.5%	13
Fish Releases	CHS	667,000 ²	508,330	451 K-55aK	1,2,9
	STW	100,000	116,346	96K-134K	1,2
Egg Transfers	CHS	0	³	³	
	STW	55,000	³	³	
Fish Transfers	CHS	945,000	970,602	912K-1,022K	
	STW	0	³	³	
Adults Passed Upstream	CHS	N/A	806	197-1,913	14
	STW	N/A	143	1 o-279	
Percent Survival	CHS	N/A	1.35%	0.91 -1.82%	
	STW	N/A	Unknown	Unknown	

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS	11.0	11.7	9.0-l 6.5	4
	STW	5.0	6.0	4.9-l 1.6	4
Acclimation	CHS	Partial	Partial	--	11
	STW	Partial	Partial	--	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Changed in 1994.

³ Not estimated for this report.

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults	CHS	Yes	Yes	--	8
Throughout Run	STW	Yes	Yes	--	8
Spawning Pop.	CHS	Yes	Yes	--	
>500	STW	Yes	No	--	
Spawning Ratio	CHS	1:1		--	
Male:Female	STW	Matrix	No	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to	CHS	Yes	Yes	--	
Disease Policy	STW	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply</u>	<u>Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Marion Forks Hatchery</u>	S	S					
CHS/19					+		BGD
CHS/21					+		BGD
STW/21					+		BGD, CWD
<u>Minto Pond</u>	N/A	S					
CHS/21					+		C W D
STW/21					+		CWD IHN in spawning adults

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

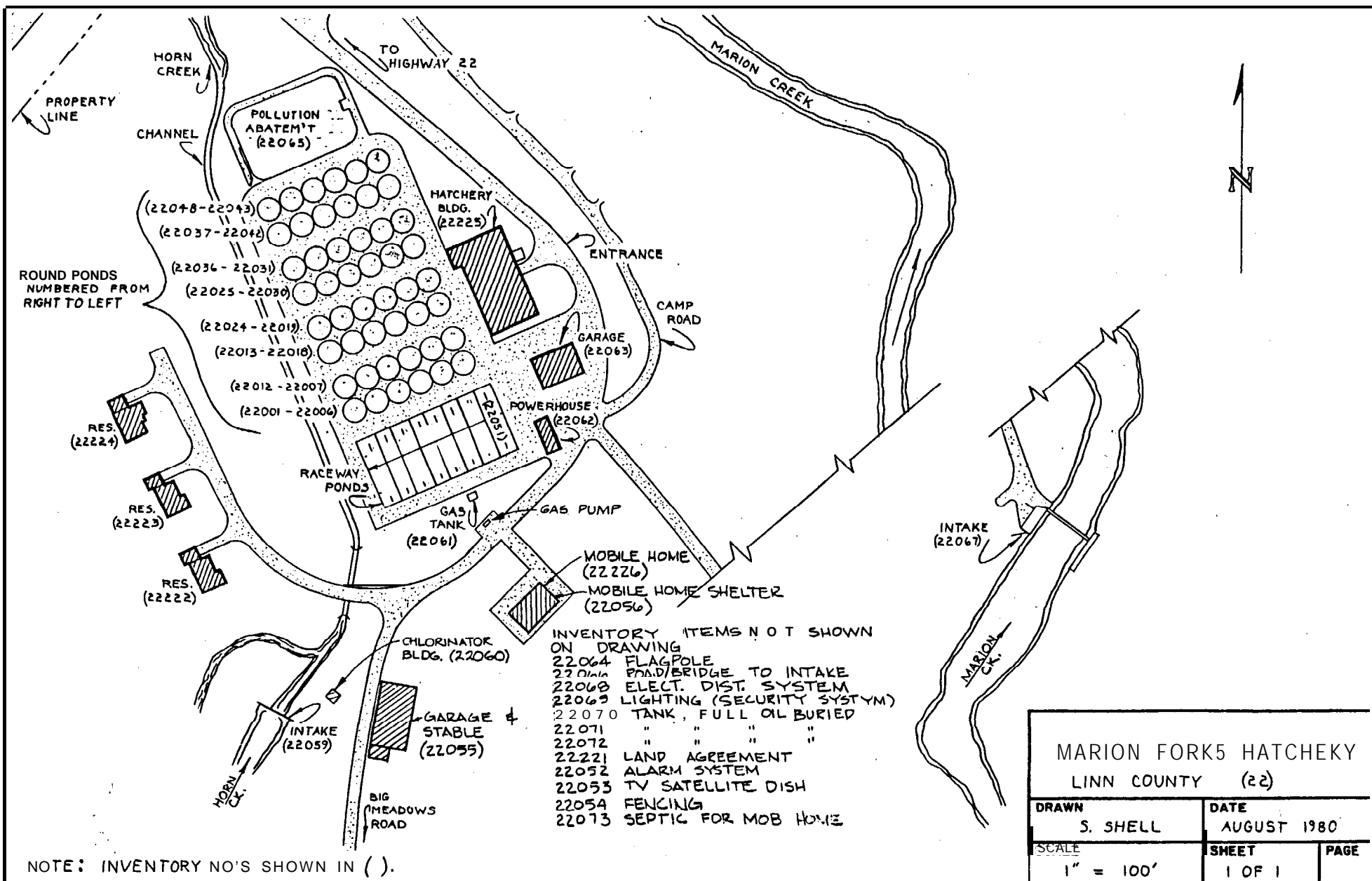
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

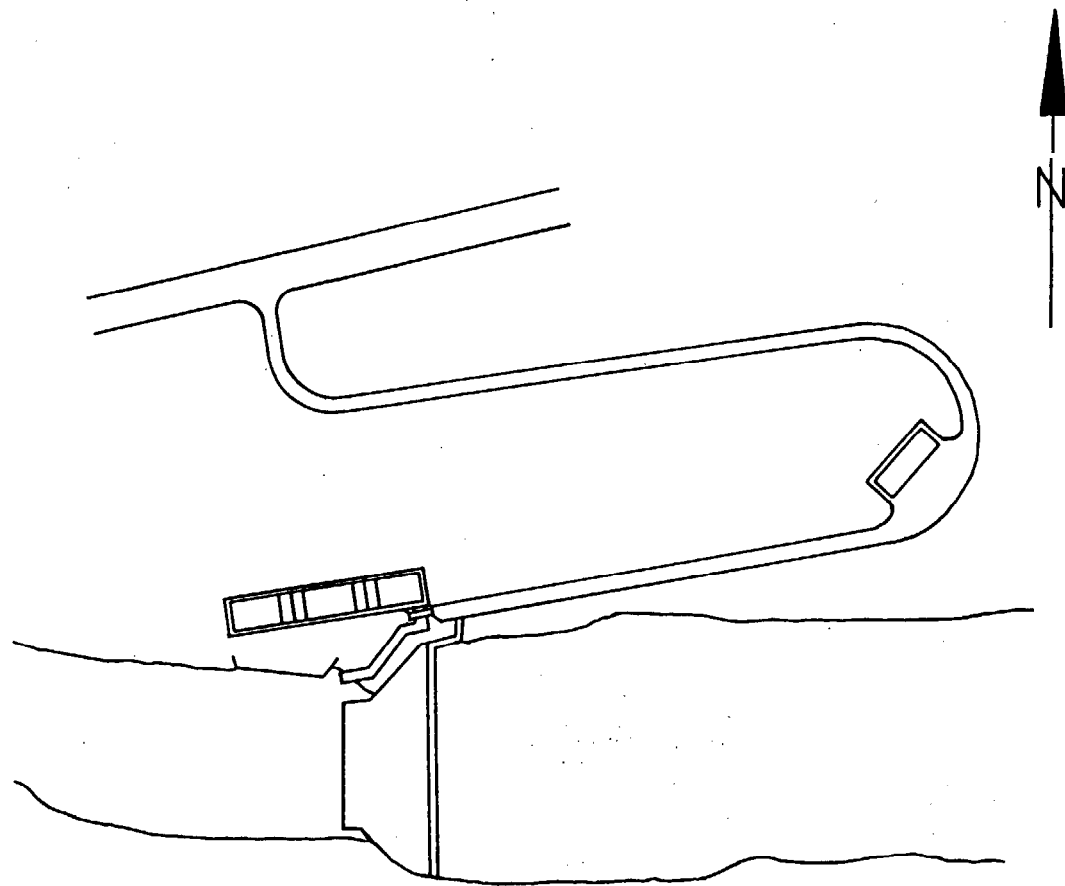
Constraints/Comments—Marion Forks Hatchery and Satellite

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Marion Creek often freezes in the winter and is not suitable for fish rearing. During very cold spells, the water flow from Horn Creek is reduced to 5,800 gpm.
2. Yearling and fingerling fish compete for pond space during the spring when maximum poundage is on-station.
3. Egg incubation is limited by the number of incubators. The water must be heated to accelerate the development of eggs and fry to meet desired release size.
4. Cold water limits growth potential during much of the year.
5. Logging in the watershed is a potential threat to water quality.

6. Need pathogen-free water supply, especially for egg development and early rearing.
7. Heated water is needed to improve egg incubation or early rearing conditions.
8. Fish attraction at the collection site is poor; therefore, not all fish swim into the trap area.
9. Replacement of 24 circular ponds with large rearing ponds could increase hatchery efficiency and productivity.
10. Very limited fish growth in the winter months because of cold water temperatures.
11. Pond size at Minto limits number of fish that can be acclimated.
12. Poor adult survival occurs at Minto holding ponds, especially when fish are held for long periods.
13. Hatchery has limited predator control.
14. Minto trap is not operated year round.

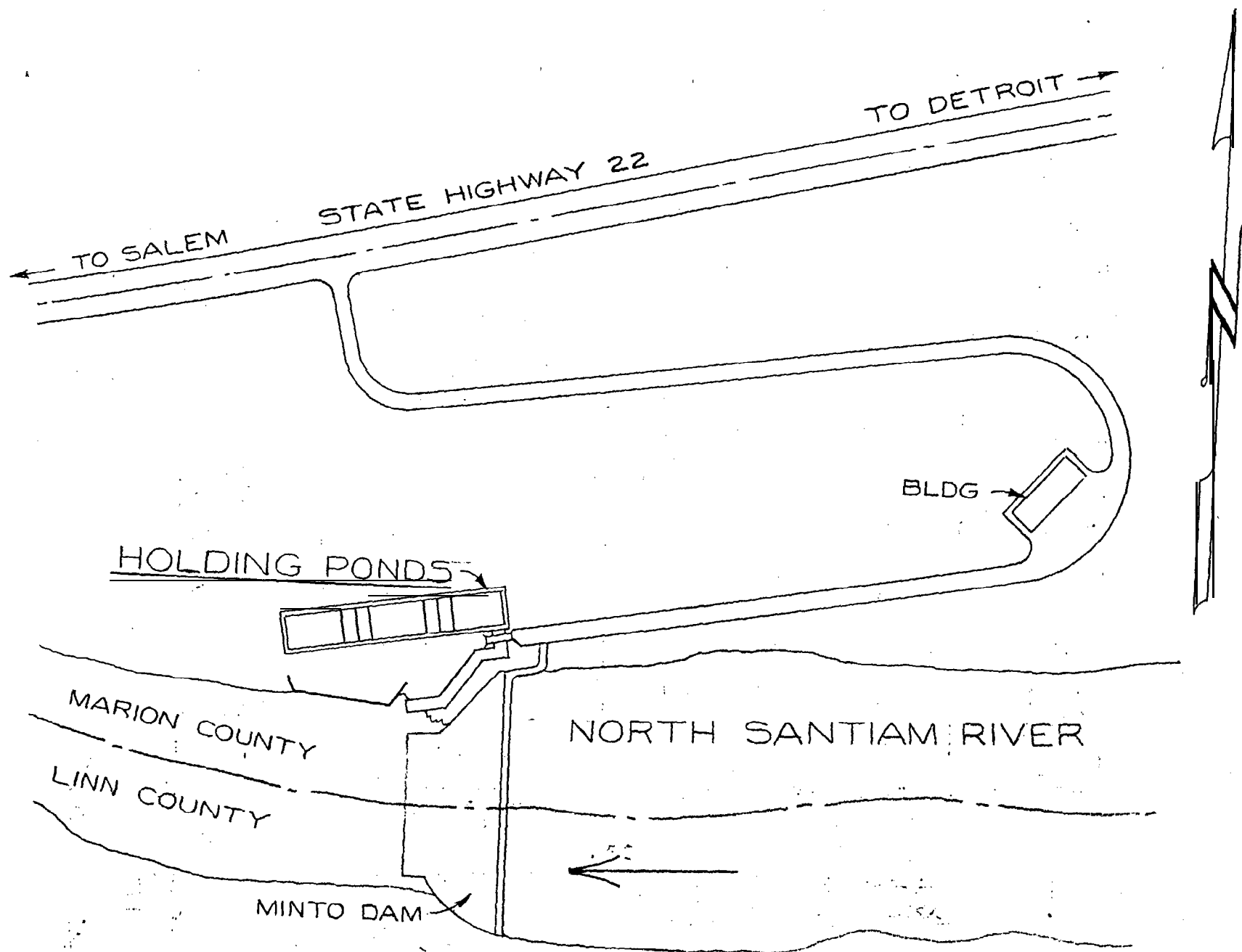




MINTO ADULT FACILITIES

DRAWN J. IRVING

SCALE 1" = 100'



SITE MAP

1" = 100'-0"

McKenzie River Hatchery

INTRODUCTION

McKenzie River Hatchery is located along the McKenzie River approximately 22 miles east of Springfield, Oregon. Site elevation is 700 feet above sea level. The facility is staffed with 5.6 FTE's.

Rearing facilities are in good condition and consist of 30 raceways, 2 adult holding ponds and 8 Canadian-style starting troughs. Water rights total 31,500 gpm from two sources: the McKenzie River and Cogswell Creek. All raceways are supplied with single-pass water. Adult holding ponds are supplied with reuse water from the raceways, or can be supplied with fresh single-pass water.

Rearing Facilities at McKenzie River Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding Pond	135	30	5	20,250	2	40,500	Concrete	20	Good	
Canadian Troughs	20	2.67	1.67	89	8	186	Fiberglass	10	Good	
Raceways	75	16.67	2.67	3,338	30	100,140	Concrete	20	Good	
Vertical Incubators					640		Fiberglass	20	Good	

PURPOSE

McKenzie River Hatchery was totally reconstructed in 1975. It is jointly funded by the U.S. Army Corps of Engineers (COE) and the Oregon Department of Fish and Wildlife as mitigation for the development of Blue River and Cougar reservoirs on the upper McKenzie River. The hatchery is used for adult collection, egg incubation and rearing of spring chinook.

GOALS

Spring Chinook: The COE mitigation agreement requires a maximum of 80,800 pounds of hatchery production to achieve a return of 4,060 adults to the McKenzie River. The management goal for the state-funded production is to return 18,000 adults (wild and hatchery) to the McKenzie River. An additional hatchery goal is to help achieve the management goal of returning 750 adult fish to the Molalla River

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Produce 983,350 smolts (105,950 pounds) for release into the McKenzie River (McKenzie stock).

Produce 975,000 fingerlings (4,875 pounds) for release into the Calapooia River (South Santiam stock).

Produce 200,000 fingerlings (2,000 pounds) for release into Blue River Reservoir (McKenzie stock).

Produce 100,000 smolts (12,500 pounds) for release into the Molalla River (South Santiam stock).

Produce 775,000 fingerlings (31,000 pounds) for transfer to CEDC net pens (combination of available Willamette River stocks).

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

McKenzie Stock Spring Chinook: Adults return to the hatchery from May to September. Peak spawning occurs from mid to late September.

South Santiam Stock Spring Chinook: No adults are collected at this hatchery. Eggs are transferred from South Santiam Hatchery.

Willamette Stock Spring Chinook: No adults are collected at this hatchery. Adults are transferred in from Dexter Ponds in June. Peak spawning occurs from mid to late September.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

McKenzie Stock Spring Chinook: Rear 634,000 fish to a size of 8-12 fish/pound and release into the McKenzie River. All fish are released on-station in February and March. Portions of these releases are coded-wire tagged.

Other McKenzie stock spring chinook programs involve rearing 200,000 fish to a size of 200 fish/pound and releasing them into the Blue River Reservoir in mid-May, and rearing 1 million fingerlings to a size of 200 fish/pound and releasing them into the Middle Fork Willamette River.

South Santiam Stock Spring Chinook: Rear 33,000 fish to size of 8 fish/pound and release into the Molalla River in November. Rear 67,000 fish to a size of 9 fish/pound and release into the Molalla River in March. Rear 975,000 fish to a size of 200 fish/pound and release into the Calapooia River in May.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at McKenzie Hatchery:

McKenzie Stock Spring Chinook: Adults returning to the hatchery are collected throughout the entire run. Substantial numbers of wild and hatchery fish pass to the upper river system. Adults are spawned at a 1:1 spawning ratio. Currently, only spring chinook returning to McKenzie Hatchery are used for broodstock. This current broodstock is a mixture of McKenzie and Willamette stocks from past spawnings.

South Santiam Stock Spring Chinook: No spawning is conducted at this facility (see South Santiam Hatchery Plan for additional information).

McKenzie Stock Summer Steelhead: No spawning is conducted at this facility (see Leaburg Hatchery Plan for additional information).

South Santiam Stock Summer Steelhead: No spawning is conducted at this facility (see South Santiam Hatchery Plan for additional information).

Willamette Stock Spring Chinook: Adults are transferred in from Dexter Ponds in June. Spawning occurs in September at a 1:3 male-to-female ratio. (see Willamette/Dexter Hatchery Plan for additional information).

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in

the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.

- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at McKenzie Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If the prespawning mortality level is high, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics for the control of bacterial diseases. Adult summer steelhead are collected and transported to Leaburg Hatchery.
- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term

basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*—changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*—updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*—details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): y s t e m t o collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

ODEW staff meets frequently with Eugene Water and Electric to discuss hatchery operations.

Communication with the General Public

McKenzie Hatchery receives approximately 7,000 visitors per year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-MCKENZIE RIVER HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHS STS	1,300 N/A	3,063 141	1,668-4,497 27-471	
Adult Prespawning Survival	CHS STS	95%	89.7% (all transferred to Leaburg H.)	84.0-96.0%	
Egg-take	CHS	2,300,000	1,800,000	1.3-2.3 million	
Green Egg-to-Fry Survival	CHS	95%	84.2%	75.2-95.1%	
Fry-to-Smolt Survival	CHS	95%	91.9%	89.2-95.0%	1
Fish Releases	CHS ² CHS ³	1,021,350 1,350,000	1,048,352 1,259,843	868K-1,156K 946K-1,436K	2,3 2,3
Egg Transfers	CHS	0	-- ⁴	-- ⁴	
Fish Transfers	CHS	0	-- ⁴	-- ⁴	
Adults Passed Upstream	CHS	N/A	N/A	N/A	
Percent Survival	CHS	N/A	1.08%	0.61-1.56%	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Smolt releases.

³ Fingerling releases.

⁴ Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS ¹	8-10	9.7	7.0-13.2	
	CHS ²	200	175.2	76.0-286	
Acclimation	CHS	Yes	Yes	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHS	Yes	Yes	--	
	STS	No	No	--	
Spawning Pop. >500	CHS	Yes	Yes	--	
	STS	N/A	N/A	--	
Spawning Ratio Male:Female	CHS	1:1	Yes	--	
	STS	N/A	N/A	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHS	Yes	Yes	--	

¹ Smolt releases
² Fingerling releases

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>McKenzie R Hatchery</u>	S	S				
CHS/19						CWD
CHS/21						
CHS/22				+		
CHS/23				+	+	CWD, EIBS Furunculosis vaccination
CHS/24				+		CWD
COH/11				+		CWD No longer reared
STS/23				+		CWD
STS/24				+		No longer reared

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes		
Continuous Monitoring of Other Parameters	All	Yes	Yes		

Objective 6

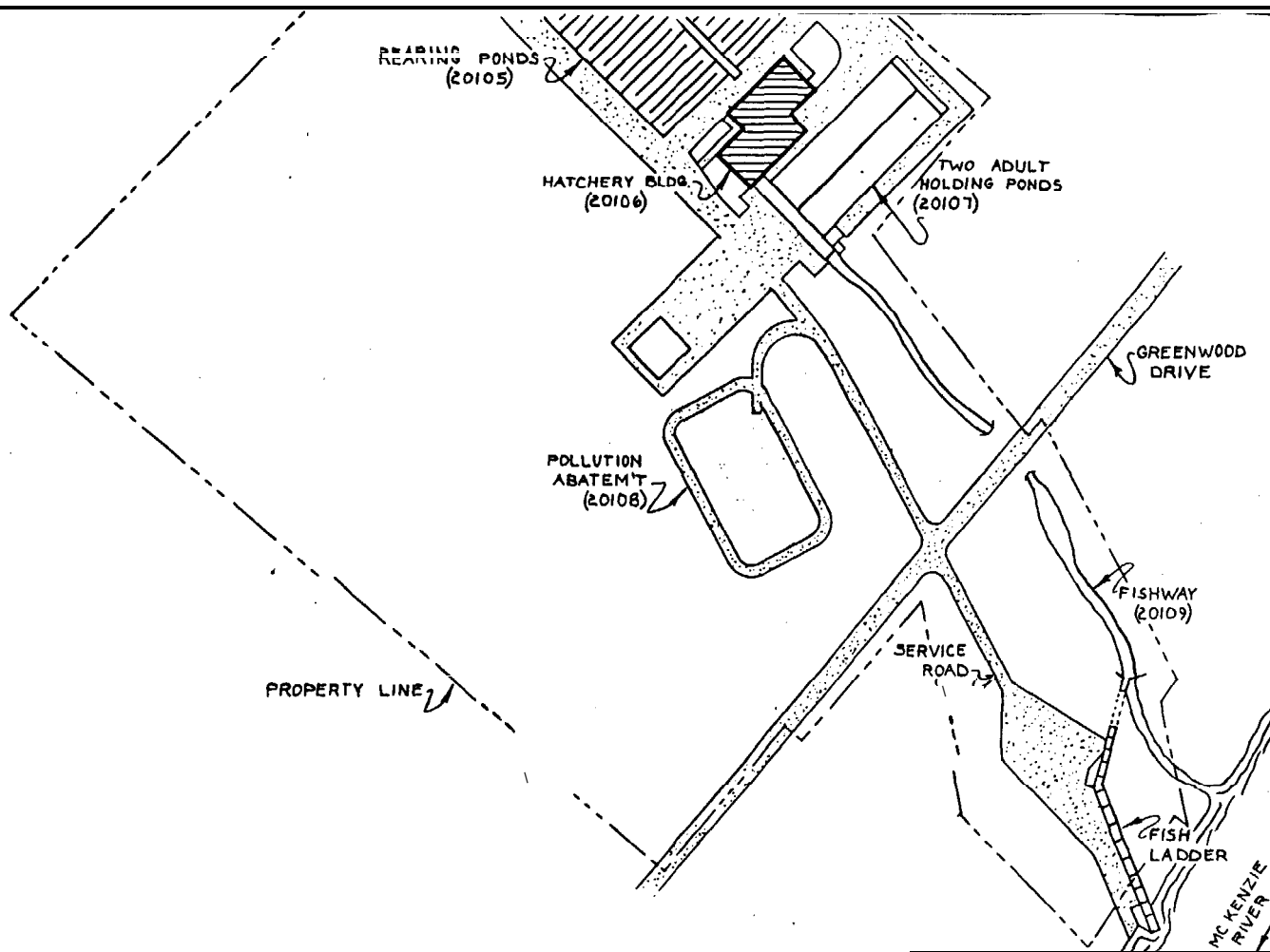
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	—	

Constraints/Comments-McKenzie River Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

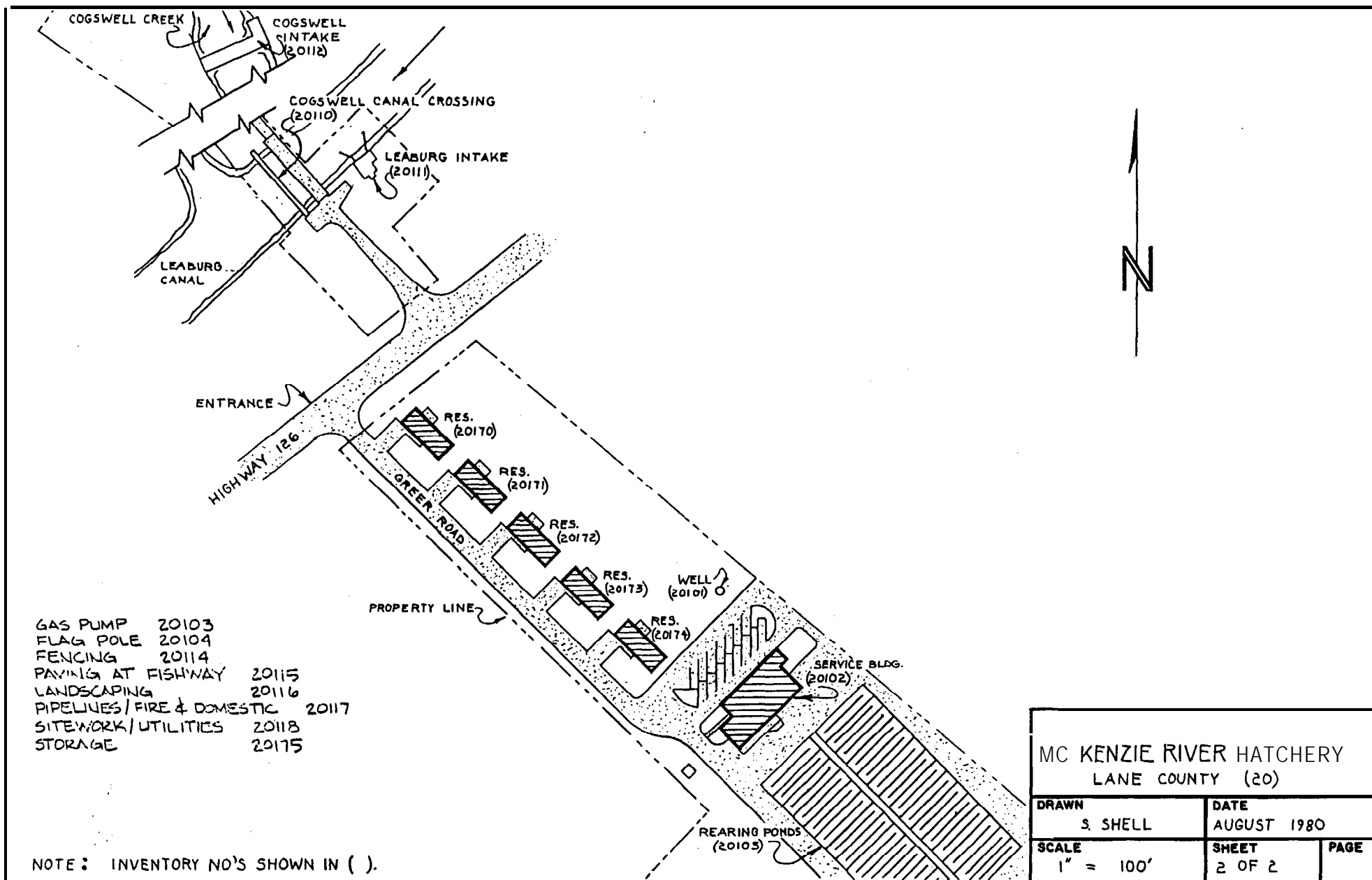
1. Unscheduled work on Leaburg Canal can interrupt water supply. Logging in Cogswell Creek watershed may reduce water quality.
2. Need the ability to mass mark the hatchery fish production.
3. Potential fish losses associated with fish entering an unscreened water canal (Waltermville Canal) used for hydropower generation on the McKenzie River downstream from the hatchery.

NOTE: INVENTORY NO'S SHOWN IN ().



MC KENZIE RIVER HATCHERY
LANE COUNTY (20)

DRAWN		DATE	
S. SHELL		AUGUST 1980	
SCALE	1" = 100'	SHEET	
		1 OF 2	PAGE



Oak Springs Hatchery

INTRODUCTION

Oak Springs Hatchery is located on the Deschutes River about 9 miles from Maupin, Oregon. Site elevation is 850 feet above sea level. The hatchery is staffed with 6.5 FTE's.

The hatchery has 39 rearing units ranging from circular tanks to 40' x 50' concrete ponds. Water is supplied by gravity flow from several springs. The present water delivery system can deliver approximately 11,670 gpm to the hatchery. Some mixing with re-use water occurs from one pond series to another.

Rearing Facilities at Oak Springs Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Brood Ponds	140.5	22	3.5	10,818	2	21,637	Concrete	56	Fair	For trout broodstock
Burrows Ponds	50	19.5	2.8	2,680	2	5,360	Concrete	25	Good	
Circular Ponds		30	3	2,120	5	10,600	Concrete	25	Good	
Lower Ponds	38.5	46.8	4	7,207	7	50,449	Concrete	56	Fair	2 RB brood 5 rearing
N Ponds	50.5	40	4.67	9,433	9	84,897	Concrete	38	Good	
Raceways	113	9.25	3.33	3,481	8	27,848	Concrete	3	Excellent	
Vertical Incubators					192		Plastic	3	Excellent	

PURPOSE

Oak Springs Hatchery was constructed in several phases beginning in 1922 with the last major construction 1992. The hatchery is presently undergoing construction of a new hatchery building. The facility, which is operated with state funds, produces steelhead and resident trout. It is currently used for egg incubation and rearing of summer steelhead, rearing of winter steelhead, and maintenance of two resident rainbow trout broodstocks.

GOALS

Summer Steelhead: Help meet the Santiam River Subbasin Management Plan objectives of increasing the annual sport catch to 700 fish in the main stem Santiam and 5,600 in the South Santiam.

Winter Steelhead: The current fishery management goal is to provide a minimum annual run of 3,800 adult hatchery fish to the Hood River Subbasin. (A draft of the Hood River Subbasin Plan is being reviewed, but has not been adopted.)

Rainbow Trout: The current fishery management strategy is to not release hatchery rainbow into the Deschutes River mainstem. There are several tributaries, reservoirs, and standing water bodies in the lower Deschutes River, however, which are stocked. The goals of fish stocking programs in the Warm Springs River and White River drainages are to provide recreational fishing opportunities and consumptive fisheries in small streams that may not be sustained by natural production alone. (A draft of the Lower Deschutes River Subbasin Plan is currently being reviewed, but has not been adopted.)

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Produce 225,000 fingerlings (2,350 pounds) for transfer to South Santiam Hatchery.

Produce 170,000 fingerlings (1,250 pounds) for transfer to Gnat Creek Hatchery.

Produce 270,000 fingerlings (1,000 pounds) for transfer to Roaring River Hatchery.

Produce 75,000 smolts (15,000 pounds) for release into the Salmon/Zigzag River System.

Produce 60,460 smolts (12,000 pounds) for release into Hood River.

Winter Steelhead

Produce 40,000 smolts (8,000 pounds) for release into the Clackamas River.

Produce 50,000 smolts (10,000 pounds) for release into the Hood River.

Rainbow Trout

Produce 60,000 fingerlings (800 pounds) and 16,000 yearlings (5,334 pounds) for release into standing water bodies in four ODFW Fishery Districts (Deschutes stock, *C. shasta* resistant).

Provide 3,820,000 eggs to ODFW hatcheries and Oregon's Salmon and Trout Enhancement Program (Oak Springs and Deschutes stock).

Produce 1,208,500 fingerlings and yearlings (65,000 pounds) for release into lakes, streams and reservoirs in seven ODFW Fishery Districts (Oak Springs stock).

Produce 180,000 yearlings (60,000 pounds) for release into lakes, streams and reservoirs for two ODFW Fishery Districts (Cape Cod stock).

- Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.
- Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.
- Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

No anadromous fish adults are collected at this hatchery. Summer steelhead eggs are normally shipped in from South Santiam Hatchery. Adults for the Hood River winter steelhead program are captured at the Powerdale Dam and held for spawning at the Parkdale Diversion Dam. Adults for the Clackamas program are captured at the Faraday Dam on the Clackamas River and held and spawned at the Clackamas Fish Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Summer Steelhead

- Rear 75,000 fish to a size of 5 fish/pound and release into the Salmon River (Sandy River System) in late April or early May. All fish are marked prior to release.
- Rear 60,460 fish to a size of 5 fish/pound and release into the Hood River (nonacclimated) in April. All fish are marked prior to release.

Winter Steelhead

- Rear 40,000 fish (wild Clackamas stock) to a size of 5 fish/pound and release directly into the Clackamas River. All fish are marked prior to release.
- Rear 50,000 fish to a size of 5 fish/pound and release into the Hood River (nonacclimated) in mid-April. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Oak Springs Hatchery:

Summer Steelhead: No summer steelhead are spawned at this hatchery (see the South Santiam Hatchery Plan for spawning protocols). The Skamania stock is acceptable for broodstock use at this facility as this was the original parent stock for these programs.

Winter Steelhead: No winter steelhead are spawned at this hatchery (see the Clackamas Hatchery Plan for spawning protocols). The intent is to use only Hood River and Clackamas stocks for each of the respective winter steelhead programs.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide

supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.

- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Oak Springs Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each rainbow trout lot.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Eggs are spawned into colanders to remove ovarian fluid, fertilized and then water-hardened in iodophor for disinfection.

- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult fish. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.

- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*-measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).

- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*—details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): T A C i s c o m p r i s e d o f regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): i s comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to

monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Confederated Tribes of the Warm Springs Indian Reservation, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Oak Springs Hatchery receives approximately 1,000 visitors per year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-OAK SPRINGS HATCHERY

Objective 1

Measures	Species	Hatchery Goal¹ 5-Year Average		Range	Constraints
Adult Capture	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	
Adult Prespawning Survival	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	
Egg-take	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	
Green Egg-to-Fry Survival	STS	95%	94.6%	87.1-98.6%	1,2,3,4,5,7
	STW	95%	N/A	N/A	1,2,3,4,5,7
Fry-to-Smolt Survival	STS	95%	79.7%	70.6-95.1%	1,2,3,4,5,6,7
	STW	95%	94.5%	76.1-97.2%	1,2,3,4,5,6,7
Fish Releases	STS	135,4600	153,323	125K-174K	3
	STW	90,000	70,868 ³	58K-92K	3
Egg Transfers	STS	0	-- ²	-- ²	
	STW	0	-- ²	-- ²	
Fish Transfers	STS	665,000	642,547	255K-797K	7,8
	STW	0	-- ²	-- ²	7,8
Adults Passed	STS	N/A	N/A	N/A	
Upstream	STW	N/A	N/A	N/A	
Percent Survival	STS (Umatilla R.)	N/A	0.41 % ³	0.05-0.64%	
	STW	N/A	Unknown	Unknown	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ Data for only three years.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STS	5.0	5.5	4.6-6.6	1,2,3,4,5,6,7
	STW	5.0	6.2	4.6-7.0	1,2,3,4,5,6,7
Acclimation	STS	No	No	--	
	STW	No	No	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	
Spawning Pop. >500	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	
Spawning Ratio Male:Female	STS	N/A	N/A	N/A	
	STW	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	STS	Yes	Yes	—	
	STW	Yes	Yes	—	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Supply</u> <u>Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./</u> <u>ERM</u>	<u>Other/Comments</u>
<u>Oak Springs Hatchery</u>	G	G				
RB/53				+		
RB/66						CTV in spawning adult, 1990
RB/72						
STS/24						
STS/91						

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

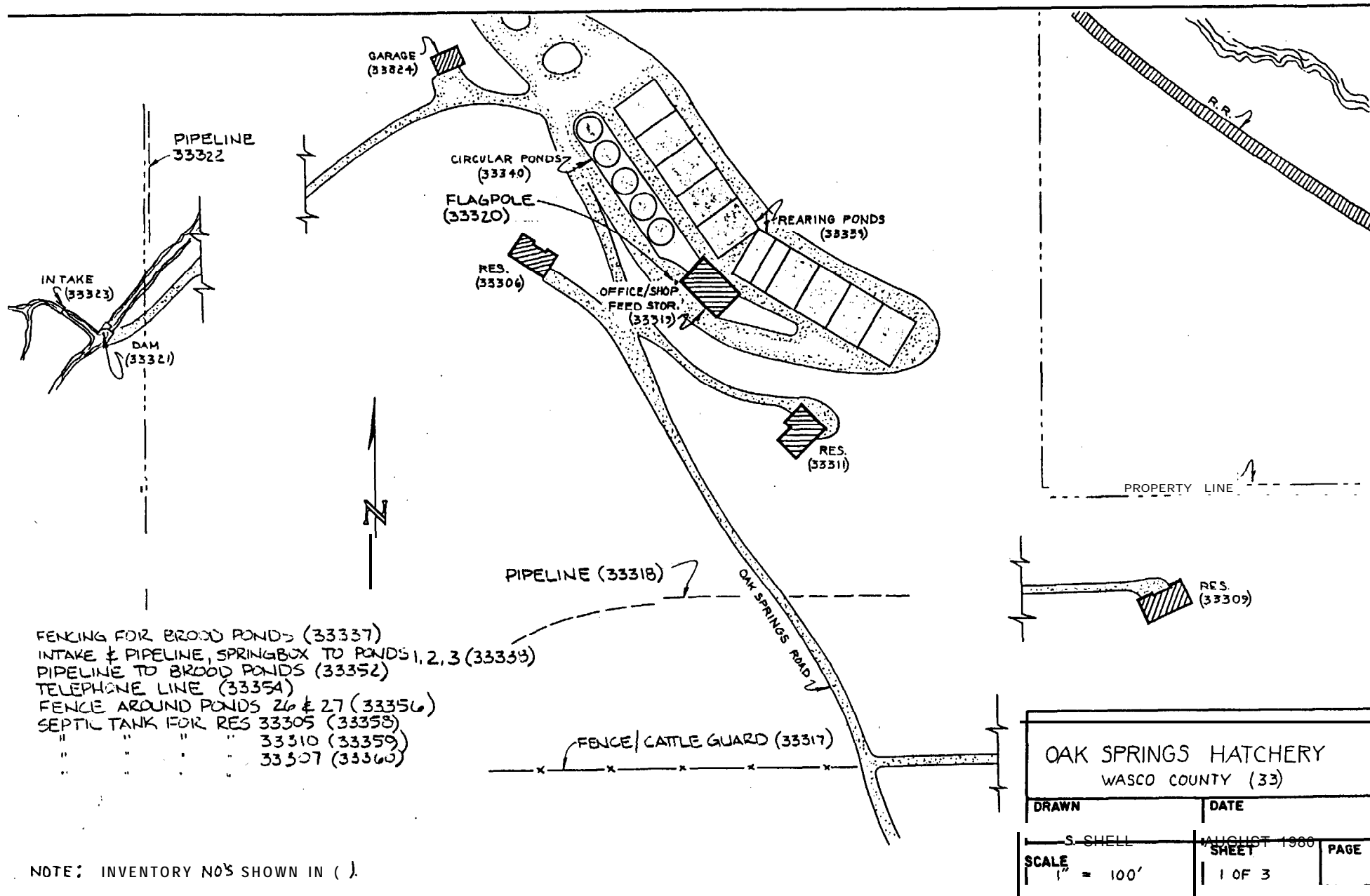
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Oak Springs Hatchery

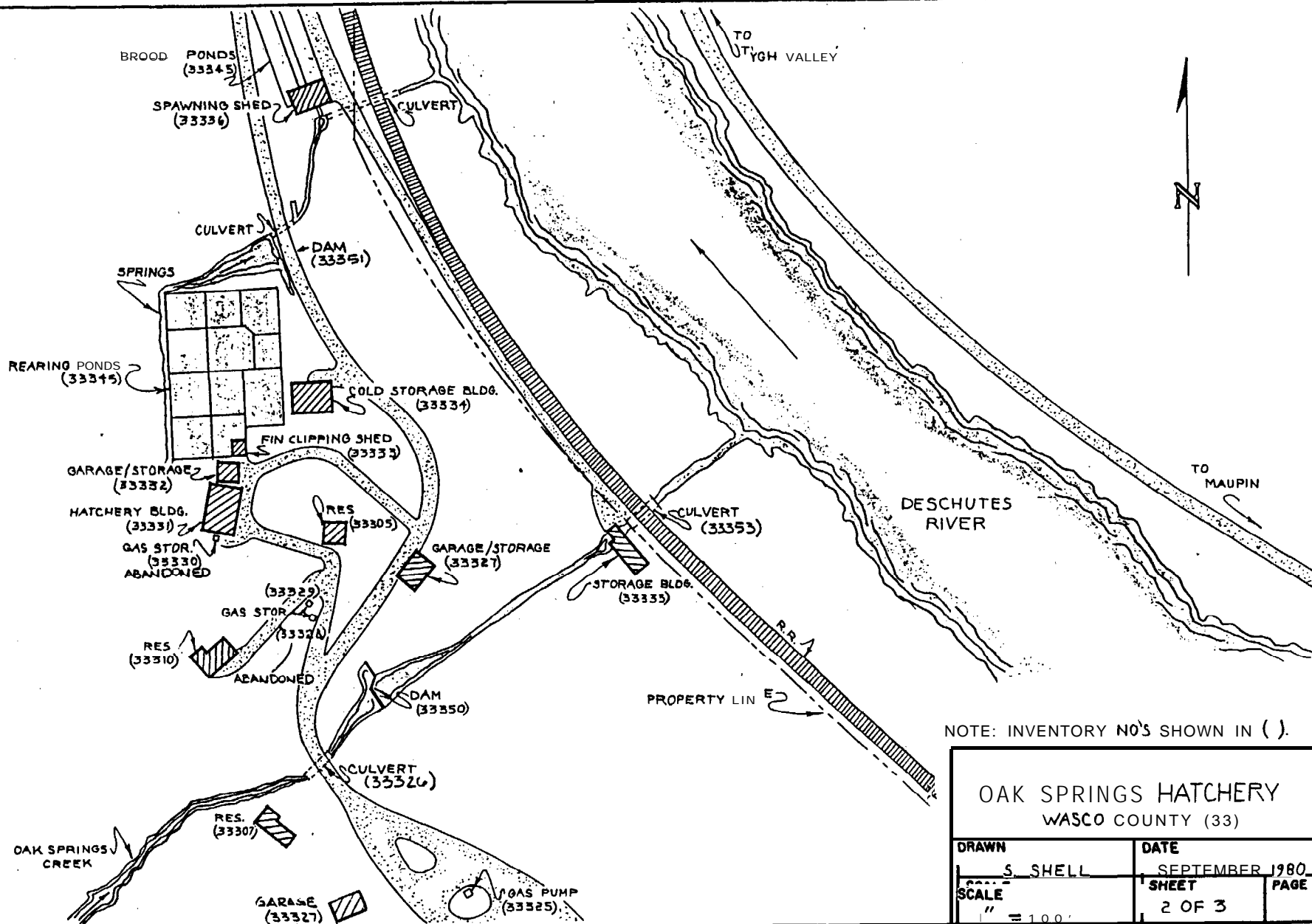
Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Water delivery system to rearing ponds is limiting fish production potential.
2. Agricultural runoff is contaminating the Oak Springs, which often leads to fish disease problems.
3. There are inadequate numbers of rearing containers to rear small groups of fish.
4. Lack adequate isolation egg incubation and early rearing facilities to meet fish production goals.
5. There are currently no chilling capabilities for incubation.
6. Need predator control measures to control avian predation.
7. Lack of funding over the past decade has created a deferred maintenance and equipment backlog.
8. The hatchery access road needs improvement so that fish transfers will not be hindered during the winter months.



OAK SPRINGS HATCHERY WASCO COUNTY (33)

DRAWN	DATE
S. SHELL	AUGUST 1980
SCALE 1" = 100'	SHEET 1 OF 3
	PAGE

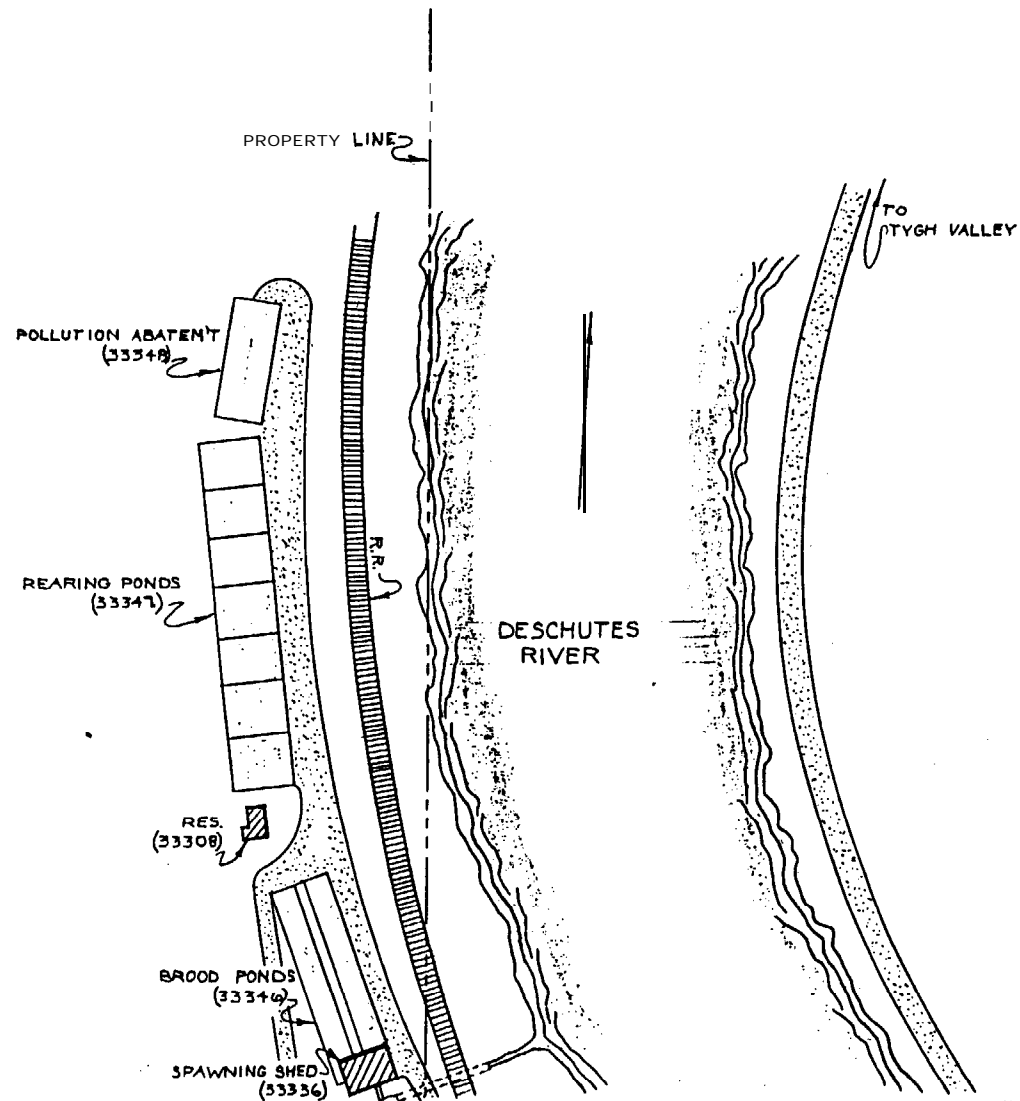


NOTE: INVENTORY NO'S SHOWN IN ().

OAK SPRINGS HATCHERY WASCO COUNTY (33)

DRAWN	DATE
S. SHELL	SEPTEMBER 1980
SCALE	SHEET
1" = 100'	2 OF 3
	PAGE

NOTE: INVENTORY NO'S SHOWN IN ().



OAK SPRINGS HATCHERY WASCO COUNTY (33)

DRAWN S. SHELL	DATE SEPTEMBER 1980	
SCALE 1" = 100'	SHEET	PAGE
	3 OF 3	

Oxbow Hatchery and Satellites (Wahkeena and Herman Creek Ponds)

INTRODUCTION

Oxbow Hatchery is located approximately 2 miles east of Cascade Locks, Oregon. Site elevation is 100 feet above sea level.

Rearing facilities are in fair to good condition and consist of 12 concrete raceways, 32 deep troughs and 32 shallow troughs. The hatchery obtains its water supply from Oxbow Springs through gravity flow. The Oxbow Springs flow dwindles to about 300 gpm in the summer and fall and is not used for rearing fish during that period.

Herman Creek Ponds (upper and lower) and Wahkeena Pond are operated as satellite facilities. The Herman Creek facility is located about 0.5 mile east of the hatchery. Rearing facilities are in fair to good condition and consist of two asphalt rearing ponds and two concrete raceways. Lower Herman Creek Ponds are three concrete rearing ponds in series which are in good condition. Wahkeena Pond is located along the Columbia River approximately 11 miles west of Bonneville Dam. The pond covers approximately 18 acres and has an estimated volume of 180 acre-feet. A total of 5.0 FTE's is used to operate Oxbow Hatchery and the satellite facilities.

Rearing Facilities at Oxbow Hatchery and Satellites

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
<u>oxbow</u>										
Deep Troughs	15.5	1.4	1.3	28	32	896	Fiberglass	13	Good	
Raceways	80	20	3	4,695	12	56,340	Concrete	42	-Fair	
Shallow Troughs	15.5	1.4	.6	13	32	416	Fiberglass	13	Good	
<u>Herman Creek Ponds</u>										
Raceways	62	14	3	2,664	2	5,208	Concrete	18	Fair	
Rearing Ponds	200	50	6	46,900	2	93,806	Asphalt	18	Good	
<u>Lower Herman Creek</u>										
Raceways	100	36	3	10,800	3	32,400	Concrete	57	Fair	Concreted bottoms '93

PURPOSE

Oxbow Hatchery was originally constructed in 1913 to provide additional rearing facilities for Bonneville Hatchery. It was relocated to its present site in 1937

following the construction of Bonneville Dam. Oxbow operated as a state-funded hatchery until 1952 when it was remodeled and expanded as part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin.

The hatchery is presently used for interim egg incubation and early rearing of spring chinook, fall chinook and coho. No adult fish are collected or spawned at Oxbow and there are no fish released at this facility. Herman Creek Ponds is used as an interim rearing site for coho transferred in from other facilities. Fish are eventually transferred to Bonneville Hatchery for acclimation and release. Wahkeena Pond serves as a rearing and release site for coho transferred from Oxbow Hatchery.

GOALS

Produce fall chinook, spring chinook and coho that will contribute to NE Pacific and Columbia River Basin commercial, tribal and sport fisheries.

OBJECTIVES

Objective 1: Hatchery Production

Coho

Produce 2 million fingerlings (83,850 pounds) at Upper Herman Creek Ponds for transfer to Bonneville Hatchery.

Produce 1.5 million fingerlings (37,500 pounds) at Lower Herman Creek Ponds for transfer to lower Columbia River net pens.

Produce 500,000 smolts (33,300 pounds) at Lower Herman Creek Ponds for release into the Umatilla River.

Spring Chinook

Produce 150,000 fingerlings for transfer to Bonneville Hatchery (Deschutes stock).

Produce 390,000 fingerlings (1,950 pounds) for transfer to Bonneville Hatchery (Carson stock).

Produce 642,000 fingerlings (5,135 pounds) for transfer to Clackamas Hatchery (Clackamas stock).

Fall Chinook

Produce 3.2 million fry (3,200 pounds) for transfer to Bonneville Hatchery.

- Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.
- Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.
- Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

There are no adult fish collected at this facility. Eggs or fry are received from a number of other hatcheries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Fall Chinook: Transfer eggs from Big Creek Hatchery for incubation; transfer 3.2 million fry to Bonneville Hatchery for rearing and release.

Spring Chinook

- Transfer eggs (Deschutes stock) from Bonneville Hatchery; rear 150,000 fish to a size of 200 fish/pound; transfer back to Bonneville Hatchery for final rearing and release.
- Transfer eggs (Carson stock) from Carson National Fish Hatchery; rear 390,000 fish to a size of 200 fish/pound; transfer to Bonneville Hatchery for final rearing and release.
- Transfer eggs from Clackamas Hatchery; rear 642,000 fish to a size of 125 fish/pound; transfer back to Clackamas for final rearing and release.

Coho

- Transfer eggs from Cascade and Sandy hatcheries; rear 1.5 million fish to a size of 150 fish/pound; transfer to Lower Herman Creek Ponds and rear to a size of 40 fish/pound and transfer to CEDC Young's Bay net pens in September. A component of the release is coded-wire tagged.

- Transfer fingerlings (150 fish/pound) from Cascade Hatchery; rear 2 million fish to a size of 16-30 fish/pound; transfer to Bonneville Hatchery for final rearing and release. A component of the 2 million fish is coded-wire tagged prior to transfer to Bonneville Hatchery.
- Transfer fingerlings (50 fish/pound) from Cascade Hatchery; rear 500,000 fish to a size of 15 fish/pound for release into the Umatilla River. A component of the release is coded-wire tagged.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

There are no adult fish collected or spawned at Oxbow Hatchery or the satellite facilities.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.

- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Oxbow Hatchery and Satellites

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.

- At spawning, if adults are held in lower Herman Creek ponds, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality level is high, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death:
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adults. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.
- Each year, after fish are released, Wahkeena Pond is drained and treated with copper sulfate to prevent eye fluke infections.

Sanitation

- All eggs brought to Oxbow Hatchery are surface-disinfected with iodophor.

- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs at Oxbow Hatchery are physically segregated from each other by separate ponds, incubator units and water supplies. At Herman Creek Ponds, fish are segregated by separate ponds at the upper site, but water from the upper ponds is the influent for the lower ponds.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.

- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*--details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*—details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.

- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and, safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (MOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Oxbow Hatchery receives approximately 750 visitors per year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-OXBOW HATCHERY AND SATELLITES

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹ 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Adult Capture	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Adult Prespawning Survival	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Egg-take	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Green Egg-to-Fry Survival	CHF	95%	N/A	N/A	
	CHS	95%	N/A	N/A	
	COH	95%	N / A	N/A	
Fry-to-Smolt Survival	CHF	95%	N/A	N/A	
	CHS	95%	N/A	N/A	
	COH	95%	80.4%	49.1-93.4%	
Fish Releases	CHF	0	0	0	
	CHS	0	0	0	
	COH	1,500,000	1,411,374	1,053K-1,900K	1,2
Egg Transfers	CHF	0	-- ²	-- ²	
	CHS	0	-- ²	-- ²	
	COH	0	-- ²	-- ²	
Fish Transfers	CHF	3,200,000	-- ²	-- ²	
	CHS	787,000	1,075,210	751 K-I ,261 K	
	COH	2,000,000	1,224,457	360K-1,715K	
Adults Passed Upstream	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Percent Survival	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	1.41%	0.0-6.87%	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	15	17.2	14.7-19.6	
Acclimation	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	Yes	Yes	—	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Spawning Pop. >500	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	
Spawning Ratio Male:Female	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	COH	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHF	Yes	Yes	--	
	CHS	Yes	Yes	--	
	COH	Yes	Yes	--	

History of Reportable Pathogens-1990-I 995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc/ERM</u>	<u>Other/Comments</u>
<u>Oxbow Hatchery</u> CHS/19	CS	CS				
CHS/66						
<u>Herman Creek Ponds</u> COH/14	N/A	S		+		CAD & EIBS

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4 5 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

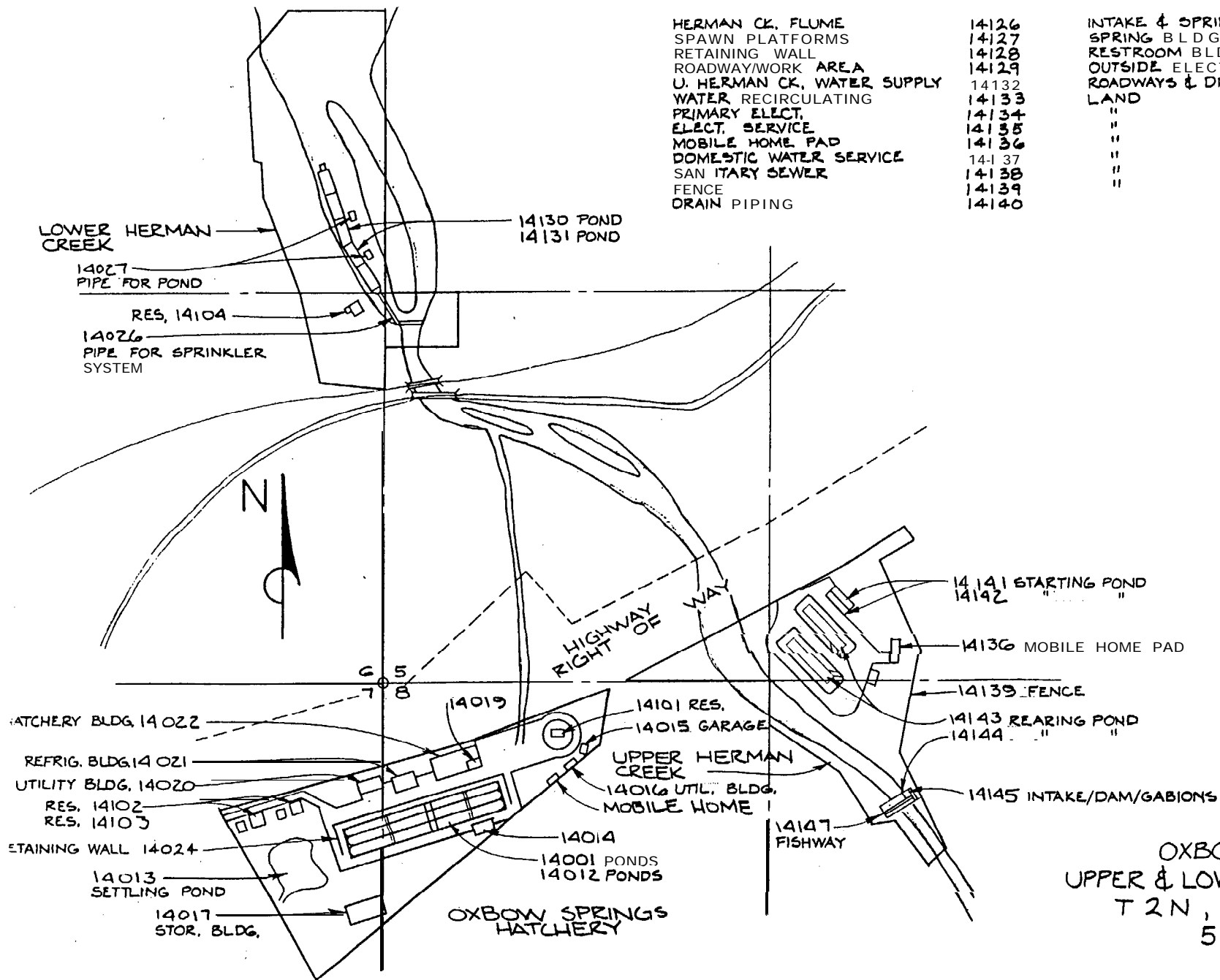
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Oxbow Hatchery and Satellites

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Production is constrained by the available water supply.
2. Need capabilities to enumerate smolt production when released at Wahkeena Pond.



HERMAN CK. FLUME
 SPAWN PLATFORMS
 RETAINING WALL
 ROADWAY/WORK AREA
 U. HERMAN CK. WATER SUPPLY
 WATER RECIRCULATING
 PRIMARY ELECT.
 ELECT. SERVICE
 MOBILE HOME PAD
 DOMESTIC WATER SERVICE
 SANITARY SEWER
 FENCE
 DRAIN PIPING

14126
 14127
 14128
 14129
 14132
 14133
 14134
 14135
 14136
 14137
 14138
 14139
 14140

INTAKE & SPRING #1
 SPRING BLDG. #2
 RESTROOM BLDG.
 OUTSIDE ELECT. WORK
 ROADWAYS & DRIVEWAYS
 LAND
 "
 "
 "
 "
 "

14018
 14019
 14023
 14025
 14028
 14029
 14030
 141a3
 14124
 14125
 14149
 14148

OXBOWHATCHERY
 UPPER & LOWER HERMAN CREEK
 T 2 N, R 8 E, SEC.
 5, 6, 7, 8

Roaring River Hatchery

INTRODUCTION

Roaring River Hatchery is located along Roaring River (tributary to Crabtree Creek of the South Santiam River in the Willamette Basin) about 18 miles northeast of Albany, Oregon. Facility elevation is 570 feet above sea level. The hatchery is staffed with 4.8 FTE's.

Six rearing ponds were rebuilt in 1987 and are in good condition; 12 rearing ponds remain in poor condition. Water rights total 11,225 gpm from Roaring River. Water is delivered by gravity flow. Some water is pumped through a filter system to insure a clean supply for egg incubation and starter tanks. Low flow available to the hatchery is 3,366 gpm in October and the high flow is about 15,000 gpm during the winter/spring. Water is reused from the upper to lower ponds.

Rearing Facilities at Roaring River Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Brood Ponds	100	20.5	3.6	7,380	2	14,760	Concrete	27	Good-Fair	RB brood ponds
Canadian Troughs	20	2.7	2	70	7	490	Fiberglass	8	Excellent	
Canadian Troughs	15	2.7	2	53	3	159	Fiberglass	4	Excellent	
Circular Ponds		16	2.5	502	3	1,506	Concrete	40	Fair	
Circular Tanks		6	3	85	2	170	Fiberglass	16	Good	
Raceway	103	19	4	7,828	1	7,828	Concrete	19	Good	
Raceway	86.8	19.17	3	4,992	1	4,992	Concrete	39	Fair	
Raceways	86	19.5	4.5	7,547	6	45,282	Concrete'	9	Good	
Raceways	70	20	3.5	4,900	12	58,800	Concrete	53	Poor	
Raceways	85.7	11	2.5	2,357	3	7,071	Concrete	46	Fair	
Troughs	15	1.1	0.5	8.3	10	83	Wood	48	Poor	
Vertical Incubators					256		Fiberglass	20	Good-Fair	

PURPOSE

Roaring River Hatchery was constructed in 1924 and is operated with state funds. Many improvements have been made to the hatchery since original construction. In 1987, six new rearing ponds were constructed to replace the original ponds.

The hatchery is a mixed-stock facility producing both anadromous fish and resident trout. The hatchery is used for rearing summer steelhead. The rainbow trout program involves broodstock maintenance, spawning, egg incubation and rearing.

GOALS

Summer Steelhead: Increase the annual sport catch to 2,450 fish in the Molalla River, 700 fish in the Santiam River mainstem, and 4,500 fish in the North Santiam River.

Rainbow Trout: Meet subbasin fishery management objectives for six ODFW Fishery Districts.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Produce 65,000 smolts (14,444 pounds) for release into the Molalla River.

Produce 121,000 smolts (26,889 pounds) for release into the North Santiam River System.

Rainbow Trout

Provide 2,089,000 eggs to ODFW hatcheries.

Produce 6,000 fingerlings (30 pounds) for release into Crabtree Lakes.

Produce 218,500 legal-sized trout (72,833 pounds) for release into streams and standing water bodies in six ODFW Fishery Districts.

Provide 800,000 fingerlings (2,476 pounds) for ODFW hatcheries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

No adults are collected at this hatchery. Summer steelhead fingerlings are shipped in from Oak Springs Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Steelhead are

reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. All steelhead are released off-station. The specific rearing and release strategies used at this hatchery are outlined below.

Summer Steelhead: Rear 186,000 fish to a size of 4.5 fish/pound and release off-station (nonacclimated) into the Molalla (65,000) and North Santiam (121,000) rivers in April. All fish are marked (fin clipped) prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

No anadromous fish spawning is conducted at this hatchery. See the South Santiam Hatchery Plan for summer steelhead spawning protocols.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.

- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Roaring River Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.

- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each lot of rainbow trout. Feeding fry (60 fish) are subsequently sampled for IPN virus because the brood fish are not killed at spawning. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult trout. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.

- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.

- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.

- *Monthly Progress Report*—document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

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Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Roaring River Hatchery receives approximately 15,000 visitors per year. The hatchery is involved in numerous public outreach activities. Local schools conduct student projects at the hatchery and the hatchery participates in local outdoor school activities. The hatchery is also involved in “Free Fishing Day” activities, the “Host Program” and with other volunteer groups such as the NW Steelheaders and others.

PERFORMANCE STANDARDS—ROARING RIVER HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	STS	N/A	N/A	N/A	
Adult Prespawning Survival	STS	N/A	N/A	N/A	
Egg-take	STS	N/A	N/A	N/A	
Green Egg-to-Fry Survival	STS	N/A	N/A	N/A	
Fry-to-Smelt Survival	STS	95%	96.0%	91.1-97.4%	
Fish Releases	STS	135,000	151,305	132K-165K	
Egg Transfers	STS	0	-- ²	-- ²	
Fish Transfers	STS	0	-- ²	-- ²	
Adults Passed Upstream	STS	N/A	N/A	N/A	
Percent Survival	s i s	N/A	Unknown	Unknown	

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STS	4.5 ³	5.3	4.4-6.6	3
Acclimation	STS	No	No	--	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ Hatchery goal revised from 5.0 to 4.5 fish/pound in 1992

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	STS	N/A	N/A	N/A	
Spawning Pop. >500	STS	N/A	N/A	N/A	
Spawning Ratio Male:Female	STS	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	STS	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>		<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Roaring R Hatchery</u>	S	S				
RB/57						
RB/72						
STS/24						
STW/13						

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes		
TSS Max. Effluent	All	cl 5 mg/L	Yes		
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

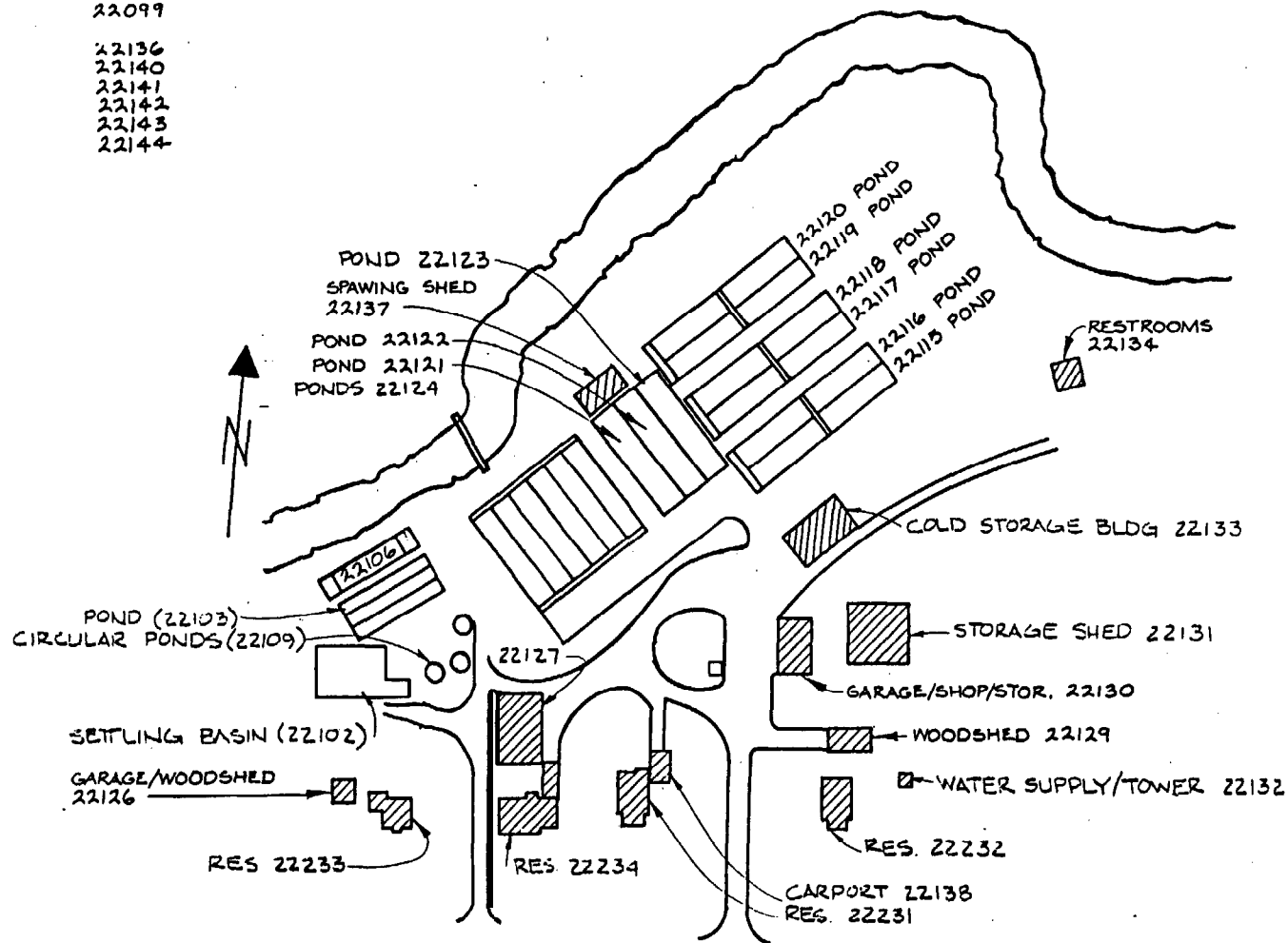
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Roaring River Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Pathogen-free water supply is needed, especially for egg development and early rearing.
2. Rearing pond modifications or development are needed to meet fish management needs.
3. Numbers and size of juveniles received from Oak Springs Hatchery must be at target size to make release size.

LAND	22095
"	22096
"	22097
"	22098
"	22099
DAM/INTAKE/LADDER	22136
PIPELINE	22140
WALKWAYS	22141
DRAINFIELD	22142
FENCE	22143
GAS TANK (UNLEADED)	22144



ROARING RIVER HATCHERY

DRAWN T. DUNN

SCALE 1"=100'

Round Butte Hatchery and Satellite (Pelton Ladder)

INTRODUCTION

Round Butte Hatchery is located on the Deschutes River at the base of Round Butte Dam, 10 miles west of Madras, Oregon. Hatchery elevation is 1,745 feet above sea level. The facility is funded by Portland General Electric (PGE).

Rearing facilities include 10 Burrows ponds, 1 oval pond, 2 adult holding ponds and 30 starter tanks. These facilities are in good condition. Water is supplied to the hatchery from tunnels in the canyon wall that collect seepage from the upstream reservoir (Lake Billy Chinook). Water is not reused in any of the rearing units.

Pelton Ladder is operated as a satellite rearing facility. The facility is a former fish passage ladder which has had some sections converted for rearing fish. It is located at the base of Pelton Reservoir (Lake Simtustus), an impoundment on the Deschutes River. There are no water rights held for Pelton Ladder. A constant water flow of 3,591 - 7,184 gpm is provided from Lake Simtustus.

Round Butte Hatchery is staffed with 5.0 FTE's. This includes the personnel required to operate the Pelton Ladder facility.

Rearing Facilities at Round Butte Hatchery and Satellite

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
<u>Round Butte</u>										
Adult Holding Pond	50.5	15	3.59	2,720	2	5,440	Concrete	22	Good	
Burrows Raceways	75	17	3.25	3,950	10	39,500	Concrete	22	Good	
Circular Tanks		6	2.5	71	30	2,130	Fiberglass	14	Good	
Oval Raceway	19.7	9.25	2.25	310	1	310	Fiberglass	22	Good	
Vertical Incubators					128		Fiberglass	22	Good	
Vertical Incubators					128		Plastic	4	Excellent	
<u>Pelton Fish Ladder</u>										
Converted Ladder Section	2000	10.75	7.5	161,250	1	161,250	Concrete		Good	

PURPOSE

Round Butte Hatchery was constructed in 1972 to mitigate for the fishery losses caused by Pelton/Round Butte Hydroelectric Complex. Round Butte and its satellite (Pelton Ladder) are used for adult collection, egg incubation and rearing of spring chinook, summer steelhead and brown trout.

GOALS

The mitigation agreement requires PGE to return an average annual run of 1,800 summer steelhead adults and 1,200 spring chinook adults to the project area (i.e., Pelton trap). At least 600 of the returning spring chinook adults must be mature females.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Produce 162,000 smolts (40,500 pounds) for release into the Deschutes River.

Spring Chinook

Produce 454,404 smolts (51,662 pounds) for release into the Deschutes River.

Brown Trout

Produce 20,050 legal-sized fish (10,025 pounds) for release into Lake Simtustus and Haystack Reservoir.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Summer Steelhead: Adults arrive in the Deschutes River from August through April. Peak spawning occurs in February. Adults are collected at a trap below Pelton Ladder and at a trap at Sherars Falls. Fish are then transported to Round Butte Hatchery for holding and spawning.

Spring Chinook: Entry of adults into the subbasin occurs between May and August. Spawning occurs in late August. Fish are collected at the Pelton Ladder trap and transported to Round Butte Hatchery for spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Summer Steelhead: Rear 162,000 smolts to a size of 4 fish/pound and release directly into the Deschutes River near Pelton Ladder in April.

Spring Chinook: Rear 454,404 fish at Round Butte Hatchery. Transfer 404,404 fish to Pelton Ladder for acclimation and final rearing; truck and release 124,432 fish from the Pelton Ladder to Hood River in March at a size of 12 fish per pound; volitionally release 329,972 fish in April at a size of 8-12 fish/pound. Rear the remaining 50,000 fish at Round Butte Hatchery to a size of 8-12 fish/pound and release directly into the Deschutes River near the Pelton Ladder in April. Evaluations of ladder-reared fish vs. hatchery-reared fish and size at release are being conducted. All fish are coded-wire tagged.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Round Butte Hatchery:

Summer Steelhead: The current practice is to collect adults throughout most of the run and incorporate wild fish into the Deschutes summer steelhead broodstock. As many wild adults as possible are incorporated into each spawning, mixing gametes from wild and hatchery adults in a 2x2 matrix. Collection of wild fish for this program occurs at Sherars Falls and Pelton trap.

Spring Chinook: Adults are collected throughout the entire run and spawned at a 1:1 male to female spawning ratio. Wild fish (approximately 5 percent) are

incorporated into the hatchery population each year. Only Deschutes stock spring chinook is used for broodstock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research-on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.

- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Round Butte Hatchery and Satellite

Health Monitoring

- Monthly health monitoring examinations of clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) per lot. Live "healthy" fish are not usually examined because parasites have not been found in the juveniles reared in hatchery spring water.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each lot of adult salmon and steelhead. If prespawning mortality level is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.

- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics for the control of bacterial diseases. Adult steelhead are not injected with antibiotics.
- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.
- **Formalin** is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon and steelhead. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*—daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*—changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

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- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
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- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recove y Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

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In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Meetings between ODFW, Confederated Tribes of the Warm Springs Indian Reservation, PGE, private land owners, Oregon State Police, Bureau of Land Management, and special interest groups are periodically held to discuss Deschutes River management issues.

PERFORMANCE STANDARDS-ROUND BUTTE HATCHERY AND SATELLITE

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	STS	380	1,445	593-2,316	4
	CHS	500	1,671	656-2,256	
Adult Prespawning Survival	STS	95%	96%	89.5-96.8%	
	CHS	95%	90.8%	86.3%-95.4%	
Egg-take	STS	700,000	733,538	525K-973K	
	CHS	600,000	596,406	458K-898K	
Green Egg-to-Fry Survival	STS	95%	74.9%	62.0-84.7%	
	CHS	95%	72.0%	54.1-85.5%	
Fry-to-Smolt Survival	STS	95%	61.6%	33.6-86.1%	2
	CHS	95%	90.8%	86.9-94.2%	
Fish Releases	STS	162,000	163,506	162K-166K	1,2,3
	CHS	330,350	260,670	238K-271K	
Egg Transfers	STS	0	-- ²	-- ²	
	CHS	0	-- ²	-- ²	
Fish Transfers	STS	0	-- ²	-- ²	
	CHS	0	-- ²	-- ²	
Adults Passed Upstream	STS	N/A	-- ²	-- ²	
	CHS	N/A	-- ²	-- ²	
Percent Survival	STS ³	N/A	4.8%	4.8%	
	CHS	N/A	1.74%	1.40-2.08%	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ Recent survival is return to Deschutes River; estimate based on in-river fish populations.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STS	4.0	4.3	3.9-5.2	
	CHS	8.0-15.0	8.7	4.2-10.5	
Acclimation	STS	No	No	--	
	CHS	Partial	Partial	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	STS	Yes	Yes	--	
	CHS	Yes	Yes	--	
Spawning Pop. >500	STS	Yes	Yes	--	
	CHS	Yes	Yes	--	
Spawning Ratio Male:Female	STS	1:1	Yes	--	
	CHS	1:1	Yes	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	STS	Yes	Yes	--	
	CHS	Yes	Yes	--	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Supply</u>		<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
	<u>Inc.</u>	<u>Rear.</u>				
<u>Round Butte Hatchery</u>	S	S				
BR/68			IHN			IHN in yearlings
CHS/66			IHN			IHN in spawning adults
STS/66			IHN			IHN in adults and juveniles

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4 5 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes		
Continuous Monitoring of Other Parameters	All	Yes	Yes		

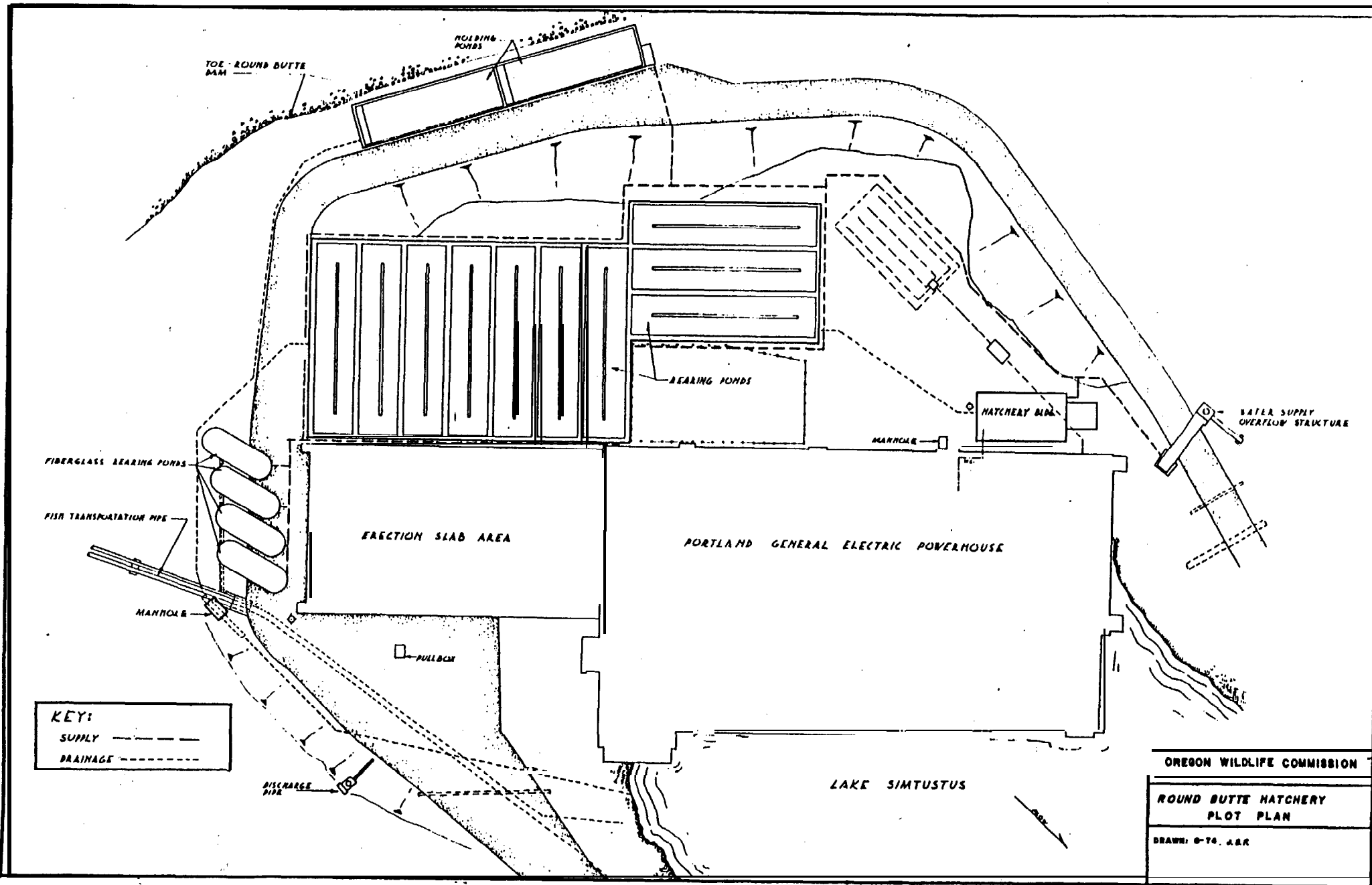
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	

Constraints/Comments-Round Butte Hatchery and Satellite

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

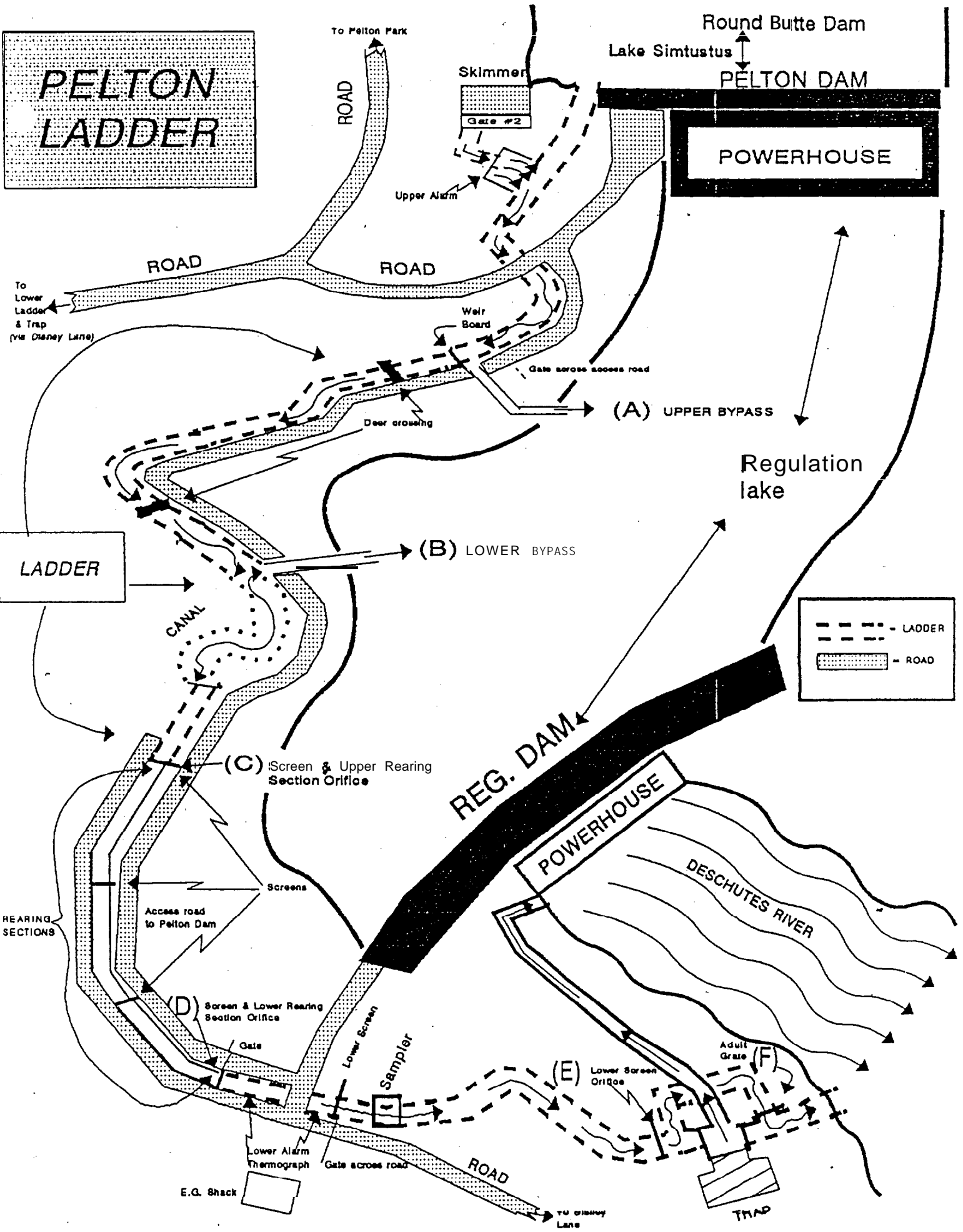
1. The size of the water delivery pipe limits water flows that can be delivered to the hatchery.
2. Adult summer steelhead diagnosed with IHN has led to the destruction of large numbers of fry and fingerlings in the past.
3. Number of rearing ponds limits flexibility in late summer. There is insufficient space available for additional gravity-fed ponds.
4. Presently, capture of wild summer steelhead adults at the Pelton Trap (RM 100) occurs too late to fully accomplish the spawning goals (i.e., wild x hatchery matings), necessitating adult collections at Sherars Falls (RM 50).
5. Sex ratio of returning spring chinook adults sometimes hampers spawning ratio goals.



KEY:
SUPPLY ———
DRAINAGE - - -

OREGON WILDLIFE COMMISSION
ROUND BUTTE HATCHERY PLOT PLAN
DRAWN: 8-76, J.R.R.

PELTON LADDER



Sandy Hatchery and Satellite (Marmot Pond)

INTRODUCTION

Sandy Hatchery is located along Cedar Creek (a Sandy River tributary) near the town of Sandy, Oregon. Hatchery elevation is 500 feet above sea level. The facility is staffed with 4.5 FTE's.

Rearing units are in fair to good condition and consist of 20 raceways, 24 incubation troughs and 1 adult holding pond. Water rights total 12,577 gpm from a spring and Cedar Creek. Water is supplied to the hatchery by gravity flow from Cedar Creek with a high flow of 8,000 gpm in March and a low flow of 1,800 gpm in July/August. A small amount of spring water is also used. Water is recirculated in the rearing ponds during the summer months. Adult holding ponds are supplied with water from the rearing ponds.

Rearing Facilities at Sandy Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Adult Holding Pond	78	35	3	8,190	1	8,190	Concrete	34	Fair	
Raceways	80	20	3.5	5,600	20	112,000	Concrete	29	Fair	
Troughs	14	1.4	1.17	23	24	552	Concrete	29	Fair	

PURPOSE

Sandy Hatchery began operation in 1951 as a state-funded facility. In 1959, the hatchery became part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin. The facility is currently used for adult collection, egg incubation and rearing of coho. It also supplies coho eggs to a variety of other facilities and programs. The hatchery also provides support for the smolt acclimation facility at Marmot Pond on the Sandy River. Marmot Pond is used to acclimate Clackamas stock spring chinook and Big Creek stock winter steelhead.

GOALS

Produce coho that will contribute to NE Pacific and Columbia River Basin commercial and sport fisheries while providing adequate escapement for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Produce 1,000,000 coho smolts (66,670 pounds) for on-station release.

Provide 2,000,000 green coho eggs to the Eagle Creek National Fish Hatchery as a backup to its program.

Provide a total of 2,445,450 eyed coho eggs to McKenzie, Oxbow and Klamath hatcheries, Oregon's Salmon and Trout Enhancement Program and Oregon State University.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Adult coho return to the Sandy River between October and mid-December. Peak spawning occurs during the first three weeks of November. Fish are collected at the hatchery. There is some adult escapement above the hatchery during high water flows.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Coho: Rear 1,000,000 fish to a size of 15 fish/pound and release on-station during May and June. A component of the release is coded-wire tagged.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are used at Sandy Hatchery:

Collect adult coho throughout the run and maintain a 1:3 male-to-female spawning ratio. The major portion of the run is comprised of hatchery fish. Only Sandy River coho is used for broodstock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Sandy Hatchery

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If the prespawning mortality level is above normal, necropsies are conducted to identify bacteria, parasites and other causes of death.

- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs and juveniles. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

- A barrier prevents adult salmon or steelhead from entering Cedar Creek above the hatchery intake.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*-measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Sandy Hatchery receives approximately 10,000 visitors per year. The hatchery is also involved in many public outreach activities such as the Oxbow Park Salmon Festival, Free Fishing Day, and hatchery tours to school groups and others.

PERFORMANCE STANDARDS—SANDY HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	COH	4,950	8,156	242-1 3,929	2,3
Adult Prespawning Survival	COH	95%	96.2%	69.01-98.3%	2
Egg-take	COH	6,000,000	4,853,709	152K-8,063K	3
Green Egg-to-Fry Survival	COH	95%	91.2%	85.4-95.6%	4,5
Fry-to-Smolt Survival	COH	95%	87.7%	82.0-92.3%	5,6,9
Fish Releases	COH	1 ,000,000	996,749	917K-1,051K	1,6,9,10
Egg Transfers	COH	4,443,450	-- ²	-- ²	
Fish Transfers	COH	0	-- ²	-- ²	
Adults Passed Upstream	COH	N/A	290 ³	N/A	
Percent Survival	COH	N/A	3.69%	0.07-8.82%	

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	COH	15.0	15.0	14.1-20.0	
Acclimation	COH	Yes	Yes	--	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Not estimated for this report.

³ One year only.

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	COH	Yes	Yes	Yes	
Spawning Pop. >500	COH	Yes	Yes	Yes	
Spawning Ratio Male:Female	COH	1:3	Yes	Yes	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	COH	Yes	Yes	--	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Sandy Hatchery</u> COH/11	S	S		+		CAD & EIBS

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes		
SS Effluent	All	<0.1 ml/L	Yes		
SS Max. Effluent	All	<0.2 ml/L	Yes		
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

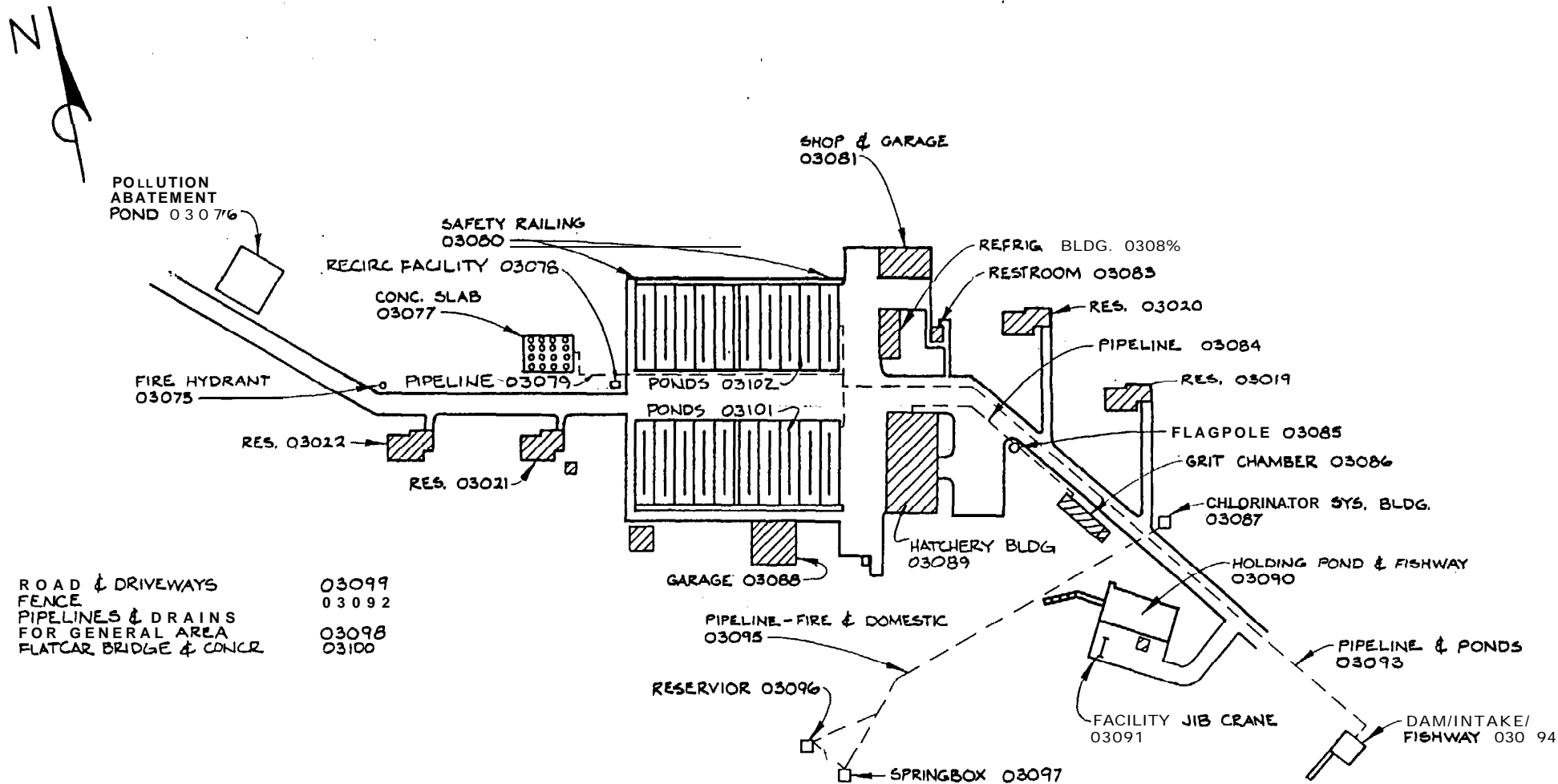
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	-- .	

Constraints/Comments-Sandy Hatchery

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Low water flows and high temperatures in the summer limit on-station production.
2. Property owners remove water from Cedar Creek during low flow periods which reduces water flows for hatchery use.
3. The adult holding pond is too small for the large number of fish handled at this facility.
4. Low water flows in Cedar Creek limit the timing of returning adults.
5. Pathogen-free water is needed, especially for egg development and rearing.
6. Heated or chilled water is needed to enhance egg incubation and early rearing.
7. Oxygen supplementation is needed to significantly increased fish production, especially during low flow periods.
8. A standby diesel generator is needed to supplement power during electrical outages.
9. Need to refurbish the rearing ponds.
10. Avian/furbearer predator control measures are needed at the hatchery.
11. Need larger outlet valves and discharge pipes.



SANDY RIVER HATCHERY

DRAWN T. DUNN

SCALE 1"=100'

South Santiam Hatchery and Satellite (Stayton Pond)

INTRODUCTION

South Santiam Hatchery is located on the South Santiam River just downstream from Foster Dam. Elevation of the facility is 500 feet above sea level. It is staffed with 4.2 FTE's.

Rearing facilities are in good condition and include an adult holding pond; 10 Burrows ponds (4,147 cubic feet each) and 4 Burrows ponds (5,022 cubic feet each). The adult holding pond is not used for rearing but is used as an acclimation pond.

The hatchery currently receives water from Foster Reservoir. A total of 8,400 gpm is available for the rearing units. An additional 5,500 gpm is used in the adult holding pond. All rearing ponds receive single-pass water.

South Santiam Hatchery has one satellite facility, Stayton Pond. The facility is located on the N. Fork Santiam River near the town of Stayton. The rearing facility consists of an old gravel pit of varying depth and shape. Stayton Pond is staffed with 1.7 FTE's.

Rearing Facilities at South Santiam Hatchery and Satellite

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
<u>South Santiam</u>										
Adult Holding Pond					1		Asphalt	26	Good	
Burrows Ponds	75	17	3.33	4,147	10	41,470	Concrete	26	Good	
Burrows Ponds	75	20.5	3.33	5,022	4	20,088	Concrete	10	Good	
Vertical Incubators					480		Fiberglass		Good	9 to 26 yrs. old
<u>Stayton Pond</u>										
11 Acre Pond		9		3,920,400		13,920,400	Earth/Gravel		Fair	Old gravel pit

PURPOSE

South Santiam Hatchery began operation at its present location in 1968. It is funded by both the state of Oregon and the U.S. Army Corps of Engineers (COE). The COE's obligation is to mitigate for fishery losses caused by development of Foster and Green Peter dams. The hatchery is used as for adult collection, egg incubation and rearing of spring chinook and summer steelhead.

Stayton Pond is operated as part of the Columbia River Fisheries Development Program (Mitchell Act)-a program to enhance declining fish runs in the Columbia River Basin. Bonneville Hatchery is used to start fall chinook for Stayton Pond. Fish reared at Stayton Pond are eventually released into Willamette River tributaries and at Bonneville Hatchery.

GOALS

Spring Chinook and Steelhead: The COE mitigation agreement requires the annual production of no more than 71,000 pounds of juvenile spring chinook and steelhead. This production level is designed to compensate for loss of 1,400 wild spring chinook spawners and 700 wild steelhead spawners above Foster Dam.

Fall Chinook: Produce lower river fall chinook that will contribute to NE Pacific and Columbia River Basin commercial and sport fisheries.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Produce 300,000 smolts (33,340 pounds) for release into the South Santiam River.

Provide a total of 3,257,200 eggs to Willamette Hatchery, McKenzie Hatchery and Oregon's Salmon and Trout Enhancement Program.

Rear 545,000 smolts (36,333 pounds) for transfer to Clackamas Hatchery (Clackamas stock).

Acclimate 434,000 smolts (48,222 pounds) for release into the South Santiam River.

Fall Chinook

Rear 8,160,000 smolts (148,400 pounds) for release into Mill Creek, Molalla River, North Santiam River and the Columbia River.

Summer Steelhead

Produce 144,000 smolts (32,000 pounds) for release into the South Santiam River.

Produce 40,500 smolts (9,000 pounds) for release into the North Santiam River.

Provide 1,425,000 eggs to Bonneville and Oak Springs hatcheries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: Adult spring chinook return to the South Santiam River from May to September. Adults are collected at the Foster Dam fish collection facility located across the river from the hatchery. Fish are transported to the hatchery holding ponds until spawning in September.

Fall Chinook: No adult fall chinook are presently collected at this hatchery or its satellite facilities. The fall chinook reared at Stayton Ponds originate from fingerlings received from Bonneville Hatchery.

Summer Steelhead: Adults return to the South Santiam River from April to November. Adults are collected at the Foster Dam fish collection facility and transported to the hatchery. Fish are held in a fishway until spawning from December through February.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Spring Chinook: Transfer 310,000 smolts from Willamette Hatchery in October; rear at South Santiam Hatchery to a size of 9 fish/pound and release on-station in early February. Transfer 434,00 from Willamette Hatchery in mid February for a two week acclimation prior to release in early March at a size of 9 fish/pound. Portions of these releases are coded-wire tagged.

Fall Chinook: Rear 9,160,000 fish at Stayton Pond to a size of 55 fish/pound. Directly release all fish in May as follows:

- 300,000 into the Molalla River
- 2,000,000 into Mill Creek
- 4,860,000 into the N. Santiam River

- 2,000,000 into the Columbia River. These fish are acclimated at Bonneville Hatchery for two weeks before release. A portion of this release is coded-wire tagged.

Summer Steelhead: Rear 184,000 fish to a size of 4.5 fish/pound; truck and release 144,400 fish into the South Santiam River and 40,500 fish into the North Santiam River in April. The North Santiam releases are not acclimated. All steelhead are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at South Santiam Hatchery:

Spring Chinook: Broodstock is all hatchery fish that originated from the Willamette stock. Adults are spawned at a 1:1 or 1:2 male-to-female ratio depending upon the run size. The South Santiam stock is the preferred broodstock; however, Willamette stock is also acceptable.

Fall Chinook: No spawning occurs at Stayton Ponds.

Summer Steelhead: Broodstock is comprised of hatchery fish that originated from Skamania stock. More adults return to the trapping facility than are needed for hatchery production. None are passed above Foster Dam. Adults are spawned at a 1:1 male-to-female ratio. Any Skamania stock is acceptable for broodstock use, but Santiam stock is preferred.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications-in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at South Santiam Hatchery and Satellite

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon and steelhead lot. If the prespawning mortality level is above normal, necropsies are conducted to identify bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult fall chinook, spring chinook and summer steelhead are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs are water-hardened in iodophor for disinfection.

- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles, and adult salmon and steelhead. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All equipment (i.e., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.

- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*—maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Ponded Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.

- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River **Inter-Tribal Fish Commission**, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

South Santiam Hatchery receives approximately 8,000 visitors per year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-SOUTH SANTIAM HATCHERY AND SATELLITE

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHS	714	3,582	1,721-7,464	5,9
	STS	1,536	3,363	1,316-6,220	5,9
	CHF	N/A	N/A	N/A	
	STW	N/A	252	139-272	
Adult Prespawning Survival	CHS	95%	92.7%	87.7-97.7%	1,4,5
	STS	95%	86.4%	70.2-96.3%	1,4,5
	CHF	N/A	N/A	N/A	
Egg-take	CHS	1,600,000	3,056,106	1,816K-3,953K	1,3,4,5,9
	STS	1,700,000	1,582,204	1,059K-1,718K	1,3,4,5,9
	CHF	N/A	N/A	N/A	
Green Egg-to-Fry Survival	CHS	95%	N/A	N/A	3,14
	STS	95%	86.2%	82.1-93.1%	3,14
	CHF	N/A	N/A	N/A	
Fry-to-Smolt Survival	CHS	95%	95.0%	85.7-99.9%	3,6,10,12,13,16
	STS	95%	88.7%	85.7-94.9%	3,6-10,12,13,15
	CHF	95%	91.9%	84.5-96.1%	
Fish Releases	CHS	300,000	362,778	239K-442K	7,9,10,13,15
	STS	184,500	197,844	182K-214K	8,9,10,13,15
	CHF ²	5,460,000	5,973,538	3,783K-7,920K	
Egg Transfers	CHS	3,257,200	-- ³	-- ³	
	STS	1,425,000	-- ³	-- ³	
	CHF	0	-- ³	-- ³	
Fish Transfers	CHS	605,000	645,778	624K-669K	
	STS	0	-- ³	-- ³	
	CHF	4,000,000	-- ³	-- ³	
Adults Passed Upstream	CHS	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	
	CHF	N/A	N/A	N/A	
	STW	N/A	257	144-364	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Stayton Ponds.

³ Not estimated for this report.

Objective 1 (continued)

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Percent Survival	CHS	N/A	0.91% ¹	0.20-1.38%	2,6,7,9
	STS ²	N/A	—	—	
	CHF ⁴	N/A	0.80%	0.09-3.42%	6

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS	9.0	8.7	7.3-11.2	6,7,12,13,15,16
	STS	4.5 ⁵	4.9	4.1-6.4	6,7,8,12-17
	CHF	55.0	52.4	43.8-56.5	
Acclimation	CHS	Yes	Yes	—	2,9
	STS	Partial	Partial	—	2,9
	CHF	Partial	Partial	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHS	Yes	Yes	--	4,5
	STS	Yes	Yes	--	4,5
	CHF	N/A	N/A	N/A	
Spawning Pop. >500	CHS	Yes	Yes	—	4,5
	STS	Yes	Yes	—	4,5
	CHF	N/A	N/A	N/A	
Spawning Ratio Male:Female	CHS	1:1 (or 1:2)	Yes	—	
	STS	1:1	Yes	—	
	CHF	N/A	N/A	N/A	

¹ Based on four years of data.

² Over the past five years, an average of 5,556 adults were recycled through the fishery by releasing fish in the South Santiam River below the hatchery.

³ Not estimated for this report.

⁴ Stayton Ponds.

⁵ Goal increased to 4.5 fish/pound in 1992.

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHS	Yes	Yes	--	
	STS	Yes	Yes	--	
	CHF	Yes	Yes	--	

History of Reportable Pathogens-1990-1995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>S. Santiam Hatchery</u>	S	S				
CHS/19				+		
CHS/24				+		EIBS
STS/23						
STSI24			IHN	+	+	(adults) VEN IHN in spawning adults
<u>Stavton Pond</u>	N/A	S				
CHS/22						
CHF/14				+		
STS/24						

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	4-5 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	—	

Constraints/Comments-South Santiam Hatchery and Satellite

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. The adult holding pond is too small to meet existing program needs. A water quality concern exists as the water supply from the deep reservoir intake is low in dissolved oxygen.
2. There is no way to directly release fish from the rearing ponds into the river. Fish must be loaded into liberation trucks for release.
3. The release of IHN-positive winter steelhead adults above the hatchery, and the potential of spring chinook being released in the near future has created a need for pathogen-free water for incubation and early rearing.
4. Separate adult holding ponds for summer steelhead and spring chinook are needed. Steelhead are currently held in the ladder below the spring chinook, thus causing high steelhead mortalities. The existing spawning room and adult handling area are inadequate.
5. The adult trapping facility needs improving to increase ease of trapping returning adults, especially spring chinook.
6. Water (pipeline) delivery system limits fish production capability.
7. Poor rearing pond design (Burrows) limits fish rearing potential.
8. Need Canadian-style rearing troughs for early rearing of summer steelhead. This will permit encompassing all portions of the run needed for maintaining genetic integrity.
9. A smolt release tube is needed for on-station releases.
10. There is no pollution abatement facility.

11. Insufficient office space.
12. Need to add one additional permanent position for adequate staffing.
13. The ability to control fish growth would be greatly enhanced by providing a way to control water temperatures in the individual rearing ponds.
14. Greater ability to heat/chill incubation water would help control egg development.
15. Need measures to control avian/furbearer predation.
16. Pond space is limited for the production required at this facility.



FENCE	22265
WATER SYSTEM	22266
ALARM SYSTEM	22267
OUTDOOR LIGHTING	22268
POND ELECT. SYSTEM	22269
SEWAGE SYSTEM	22270
LANDSCAPING	22271
LAND	222610
"	222615
"	222275

MOBILE HOME SITE
22262

FIRE HOSE BOX
22264

RES. 22240

RES. 22241

HATCHERY BLDG. 22247

TABLET 22249

HOLDING POND/LADDER
22261

REARING PONDS

SCREEN BOX	22248
FLAGPOLE	22250
FIRE HOSE BOX	22263
SEPTIC TANK 1000 GAL + DRAINFIELD	22272
MOBILE HOME - KINGSTON	22242
MOBILE HOME - STATLER	22243
STORAGE BLDG - METAL	22244

S. SANTIAM HATCHERY

DRAWN

T. DUNN

SCALE 1" = 100'

Umatilla Hatchery and Satellites

(Bonifer Pond, Minthorn Springs, Imeqes C-mem-ini-kern and Thornhollow)

INTRODUCTION

Umatilla Hatchery is located adjacent to the Columbia River, 3.5 miles west of Irrigon, Oregon. Facility rearing units include 34 raceways and 8 troughs. Water is supplied to the hatchery from four remote wells capable of pumping 5,100 gpm and one well station capable of pumping 10,000 g-pm. The facility is staffed with seven permanent employees and one seasonal employee.

The four satellite facilities (Bonifer Pond, Minthorn Springs, Imeqes C-mem-ini-kern and Thornhollow) located in the subbasin are operated by staff from the Confederated Tribes of the Umatilla Indian Reservation.

Rearing Facilities at Umatilla Hatchery and Satellites

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Oregon Ponds	91	18.75	3.5	5,972	10	59,720	Concrete	4	Excellent	
Michigan Ponds	91	9	2.75	2,252	24	54,948	Concrete	4	Excellent	Oxygen supplementation
Canadian Troughs	19.1	2.67	1.58	72	8	576	Fiberglass	4	Excellent	
Vertical Incubators					552		Plastic	4	Excellent	

PURPOSE

The Umatilla Hatchery was authorized under the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program and began operation in 1991. Hatchery funding is provided by Bonneville Power Administration. The hatchery is used for egg incubation and rearing of spring chinook, fall chinook and summer steelhead.

The four satellite facilities (Bonifer Pond, Minthorn Springs, Imeqes C-mem-ini-kern and Thornhollow) are used for juvenile fish acclimation and Minthorn is also used for adult holding and spawning.

GOALS

The NPPC authorized the hatchery construction to produce up to 290,000 pounds of salmon and steelhead for release into the Umatilla River. This production is designed to:

- Partially mitigate for fish losses caused by hydroelectric dams on the Columbia River.
- Use artificial propagation as a component of the Umatilla fisheries restoration program to achieve natural and hatchery adult return goals as described in the Umatilla Hatchery Master Plan (1989).
- Test Michigan- versus Oregon-type rearing strategies (oxygen supplementation) and other experimental and supplemental rearing strategies.

OBJECTIVES

Objective 1: Hatchery Production

URB Fall Chinook

Produce 5,940,000 smolts (99,000 pounds) for release into the Umatilla River.

Spring Chinook

Produce 1,290,000 smolts (114,000 pounds) for release into the Umatilla River.

Summer Steelhead

Produce 210,000 smolts (42,000 pounds) for release into the Umatilla River.

Provide 1,800 eggs to Oregon's Salmon and Trout Enhancement Program.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish -production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Adults for the fall chinook program are collected at Bonneville Hatchery (see Bonneville Hatchery Plan), Priest Rapids Hatchery (see Priest Rapids Hatchery Plan) and from the Umatilla River. Adults for the spring chinook program are collected at Carson National Fish Hatchery (see Carson National Fish Hatchery Plan) and at Ringold Springs Hatchery (see Ringold Springs Hatchery Plan). Adults for the summer steelhead program are collected from the Umatilla River (Three Mile Dam) and transferred to Minthorn Pond for holding and spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size so that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Various release strategies are used to ensure that fish migrate from the Umatilla River system with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

URB Fall Chinook: Rear 150,000 fish to a size of 8 fish/pound and transfer to acclimation facilities in early April. Rear 2,682,000 fish to a size of 60 fish/pound and transfer to acclimation facilities in mid May. All fish are marked prior to release.

Spring Chinook

- Rear 510,000 fish to a size of 8 fish/pound and transfer to acclimation facilities in Mid February for acclimation.

All spring chinook are marked prior to release.

Summer Steelhead

- Rear 50,000 smolts and transfer to Bonifer Ponds for a 3-4 week acclimation period; release into the Umatilla River in mid-April at a size of 5 fish/pound
- Rear 50,000 smolts and transfer to Bonifer Ponds for a 3-4 week acclimation period; release into the Umatilla River in early May at a size of 5 fish/pound.
- Rear 50,000 smolts and transfer to Minthorn pond for a 3-4 week acclimation period; release into the Umatilla River in mid-April at a size of 5 fish/pound.

All summer steelhead are marked prior to transfer and release.

Because of the shortage of water available from the wells at the hatchery, the current fish production goals have been greatly reduced from the original production goals that the hatchery was slated to produce. Production goals reflect having only 9,000 gallons per minute of well water available instead of the 15,000 gallons per minute of water that the hatchery was designed to use.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Umatilla Hatchery:

URB Fall Chinook: No adults are collected at the hatchery, but are collected at Three Mile Dam (Umatilla River), at Bonneville Hatchery (see Bonneville Hatchery Plan) and at Priest Rapids Hatchery (see Priest Rapids Hatchery Plan). The hatchery goal is to spawn fish from throughout the run using a 2:3 male-to-female ratio if the population is over 250 fish.

Spring Chinook: No adults are spawned at this hatchery (see Carson National Fish Hatchery Plan and Lyons Ferry Hatchery Plan).

Summer Steelhead: Adults captured at Three Mile Dam and held at Minthorn Springs for spawning. The preference is to use wild fish for broodstock. Wild fish are collected at a rate of 10 percent of the run for hatchery broodstock. When there is a shortage of wild broodstock then hatchery fish are used as broodstock but not exceeding 50 percent of the total adults used for spawning. Adults are collected throughout the entire run and spawned using a 1:1 male-to-female ratio or matrix spawning ratio depending on run size. Only Umatilla River summer steelhead are used for broodstock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size.

A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Umatilla Hatchery and Satellites

Health Monitoring

- Monthly health monitoring examinations are conducted on five live fish per lower Oregon and Michigan index series of raceways, and five moribund/dead fish from each Oregon and Michigan index raceway. Results are reported on the ODFW Fish Examination form and Umatilla Hatchery annual progress report.
- When Umatilla summer steelhead are spawned, all adults are examined for viral pathogens using samples of ovarian fluid, milt and kidney/spleen/pyloric caeca. Necropsies on all mortality up to 20 fish are conducted for bacteria, parasites and other causes of death. Additional examinations are conducted if mortality exceeds normal levels. Results are reported on ODFW Viral Examination or Fish Examination forms and in the Umatilla Hatchery fish health monitoring annual report.
- Prior to transfer or release, fish are given a health exam. This is a special examination that includes aspects of the monthly monitoring exam.
- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally, as needed, for the control of bacterial infections.

- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adults. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All eggs brought to the Umatilla Hatchery are surface-disinfected with iodophor.
- All equipment (i.e., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish/eggs are physically segregated from each other by separate incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed. The following environmental parameters are currently monitored at all ODFW hatcheries:

- *Total Suspended Solids (TSS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids (SS)*—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- #Z—measured quarterly when settleable solids are measured.

- **Water Temperatures**-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*—records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Poned* Report-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.

- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*—document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (MOT): This group is comprised of representatives from fish management agencies and tribes. MOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the U.S. *v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Other: Periodic meetings involving staff from the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and ODFW are held to discuss the operation and management of the hatchery and satellite facilities. The Umatilla Hatchery and Basin Annual Operation Plan is co-authored by the CTUIR and ODFW.

PERFORMANCE STANDARDS-UMATILLA HATCHERY AND SATELLITES

Objective 1

Measures	Species	Hatchery Goal¹	5-Year Average	Range	Constraints
Adult Capture	CHF	2,228	N/A	N/A	1,3
	CHS	404	N/A	N/A	1,3,4
	STS	106	N/A	N/A	1
Adult Prespawning Survival	CHF	80%	N/A	N/A	1,3
	CHS	80%	N/A	N/A	1,3,4
	STS	79%	N/A	N/A	1
Egg-take	CHF	3,742,000	N/A	N/A	2
	CHS	680,000	N/A	N/A	2,4
	STS	227,000	N/A	N/A	
Green Egg-to-Fry Survival	CHF	80%	90.6 ²	81.2-98.6%	
	CHS	80%	N/A	N/A	
	STS	86%	N/A	N/A	
Fry-to-Smolt Survival	CHF	95%	94.6% ²	90.1-96.6%	
	CHS	95%	88.3% ²	86.5-95.0%	
	STS	80%	N/A	N/A	
Fish Releases	CHF	2,832,000	2,726,287 ²	2,646K-2,854K	1
	CHS	510,000	1,272,757 ²	1,057K-1,424K	1,4
	STS	150,000	116,758 ²	104K-136K	1,2
Egg Transfers	CHF	0	N/A	N/A	
	CHS	0	N/A	N/A	
	STS	1,500	N/A	N/A	
Fish Transfers	CHF	0	N/A	N/A	
	CHS	0	N/A	N/A	
	STS	0	N/A	N/A	
Adults Passed Upstream	CHF	N/A	N/A	N/A	
	CHS	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	
Percent Survival ³	CHF	0.003%	0.93%	0.07-3.18%	
	CHS	0.002-0.75%	0.25% ⁴	0.15-0.31%	
	STS	0.027%	— ⁵	— ⁵	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Three years only.

³ Smolt-to-adult survival.

⁴ Data for four years.

⁵ Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery</u>	<u>Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHF	60.0		63.4 ¹	62.2-65.3	
	CHS	8.0 ²		18.2	8.0-39.2	
	STS	5.0		5.2	4.5-5.8	
Acclimation	CHF	Partial		N/A	N/A	
	CHS	Partial		N/A	N/A	
	STS	Yes		N/A	N/A	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery</u>	<u>Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHF	Yes		N/A	N/A	3
	CHS	Yes		N/A	N/A	1,3,4
	STS	Yes		N/A	N/A	
Spawning Pop. >500	CHF	Yes		N/A	N/A	
	CHS	Yes		N/A	N/A	4
	STS	No		N/A	N/A	
Spawning Ratio Male:Female	CHF	2:3		N/A	N/A	
	CHS	2:3		N/A	N/A	4
	STS	1:1		N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery</u>	<u>Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHF	Yes		N/A	N/A	
	CHS	Yes		N/A	N/A	
	STS	Yes		N/A	N/A	

¹ Three years only.

² Size goal changed in 1994.

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Umatilla Hatchery</u>	G	G				
CHS/75				+		
CHF/45						
CHF/91						
STS/91				+		
STW/50						
<u>Bonifer Pond</u>	N/A	S				
CHS/75						
STS/91						
<u>Minthorn Springs</u>	N/A	S				
CHF/91						
COH/91						
STS/91			IHN			
<u>Imeques</u>	N/A	S				
CHF/75						
<u>Thornhollow</u>	N/A	S				
CHF/95						
<u>Three Mile Dam</u>	N/A	S				
CHF/91						
STS/91			IHN			

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	N/A	N/A	
TSS Max. Effluent	All	4 5 mg/L	N/A	N/A	
SS Effluent	All	<0.1 ml/L	N/A	N/A	
SS Max. Effluent	All	<0.2 ml/L	N/A	N/A	
Downstream Temp	All	Varies	N/A	N/A	
pH	All	6.0-9.0	N/A	N/A	
Continuous Monitoring of Other Parameters	All	Yes	N/A	N/A	

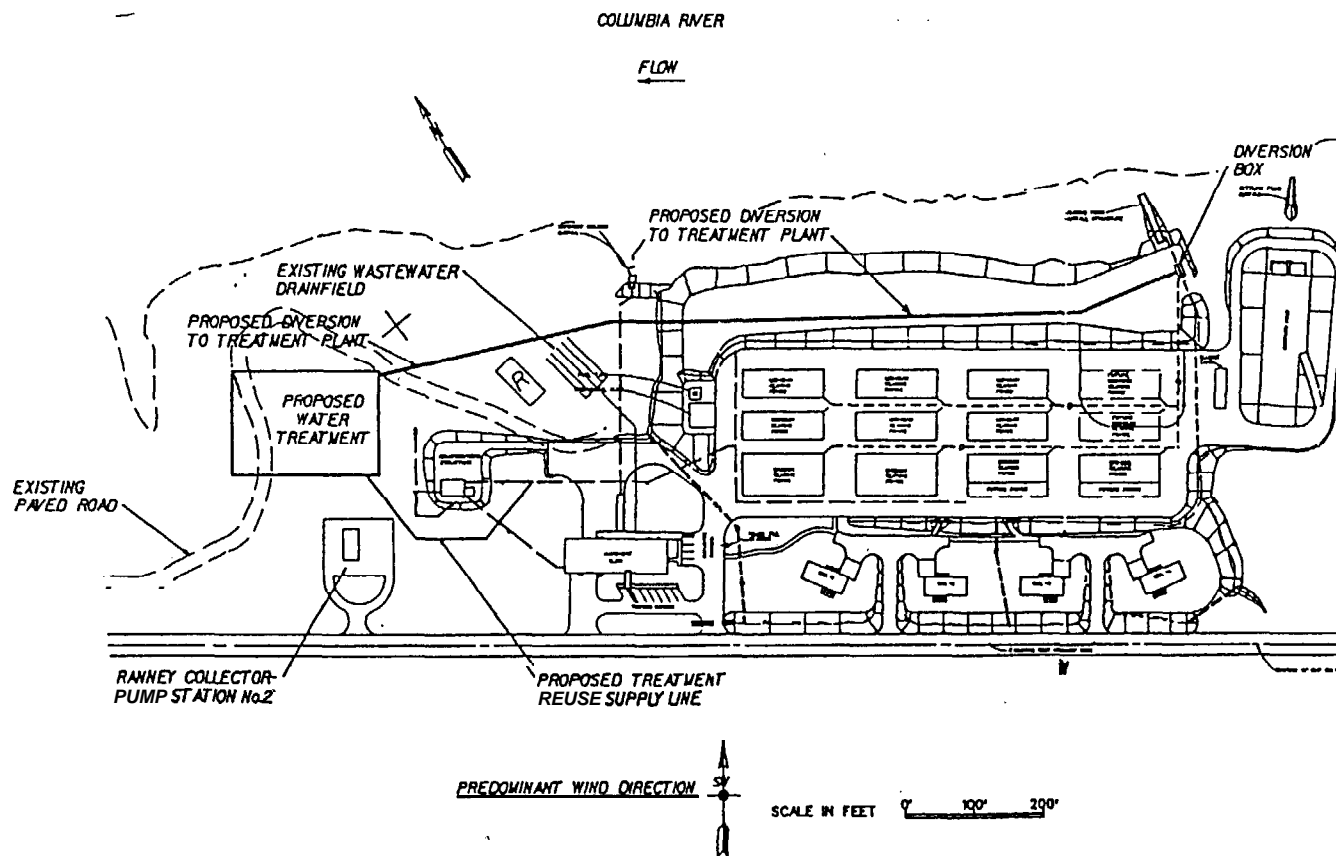
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	N/A	--	

Constraints/Comments—Umatilla Hatchery and Satellites

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

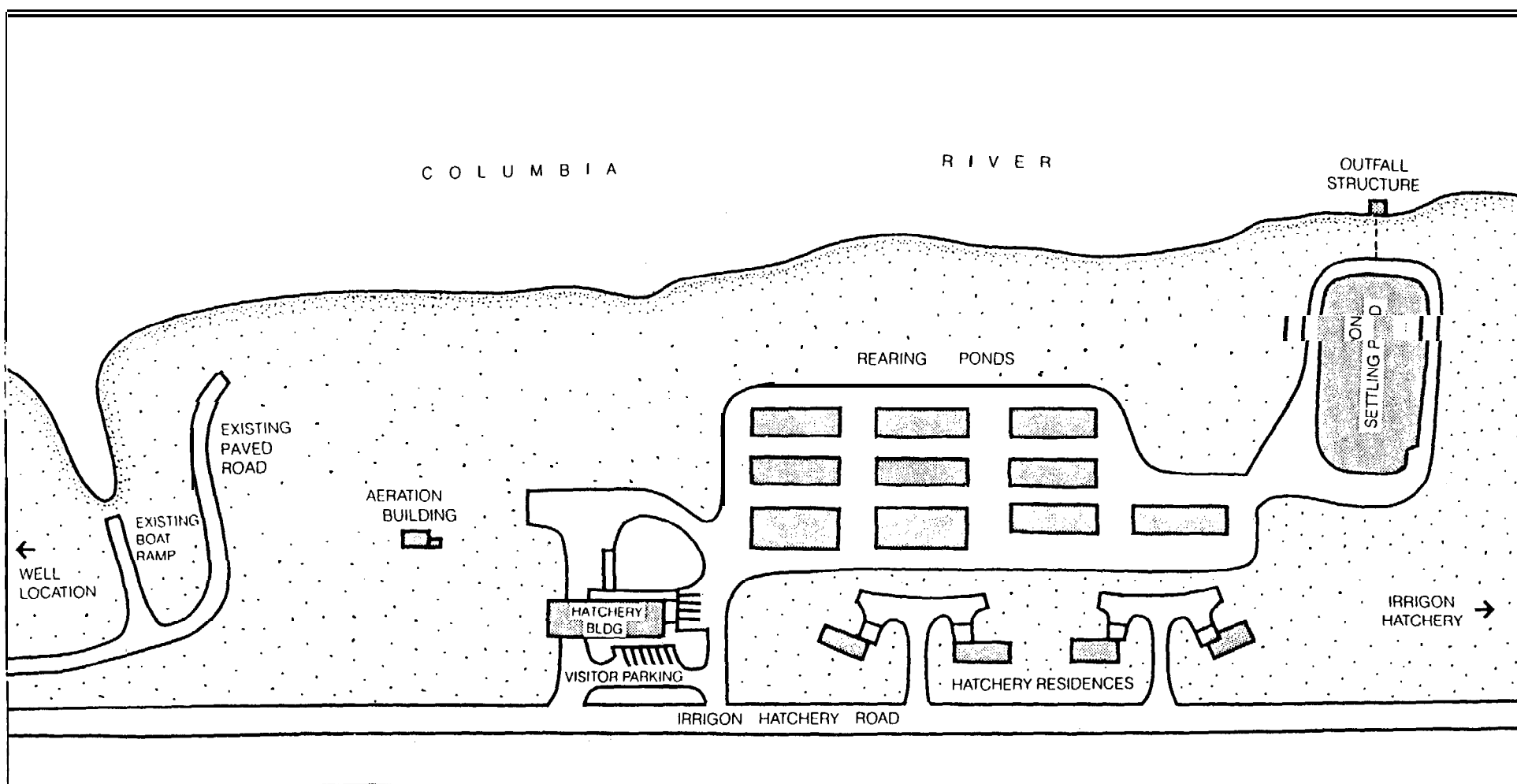
1. There is insufficient water available at Umatilla Hatchery to accomplish the designed hatchery program. As a result, fish production has been cut drastically to reflect the existing water supply.
2. The full rearing potential is not being realized for 'all species due to the study design (replication) parameters of the oxygen supplementation evaluation.
3. Additional brood holding and spawning facilities need to be developed.
4. Shortage of spring chinook salmon broodstock has led to decreased production of smolts.



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OWNER
AND
DESIGN
DRAWING

U. S. ARMY ENGINEER DISTRICT PORTLAND, OREGON	
LOWER SNAKE RIVER FISH AND WILDLIFE COMPENSATION PLAN UMATILLA FISH HATCHERY EFFLUENT REUSE SUPPLY PROPOSED SITE PLAN	
DATE 10/1/88	SCALE AS SHOWN ON PLAN
DESIGNED BY JES-1	PLATE JES-1



SCALE IN FEET

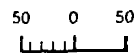
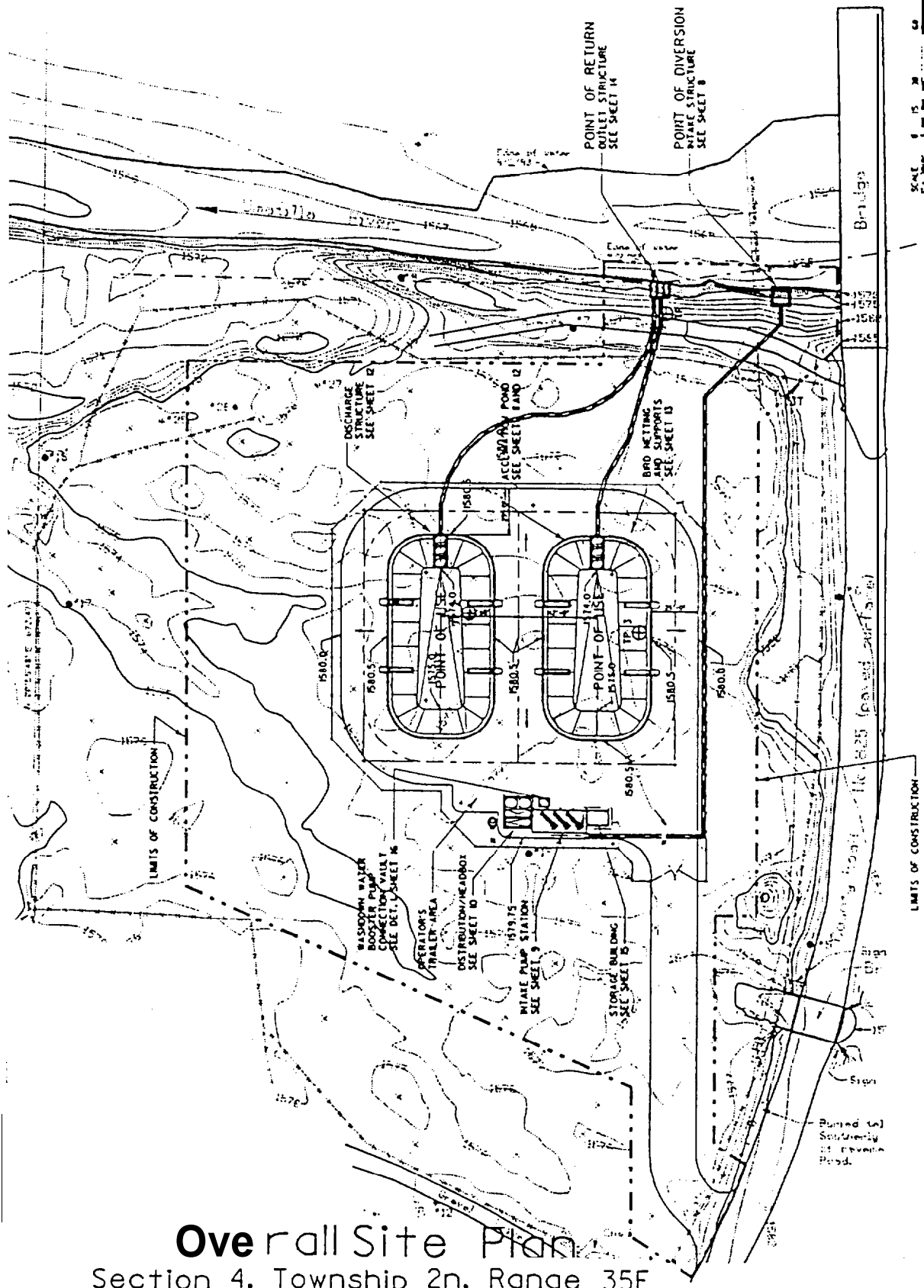


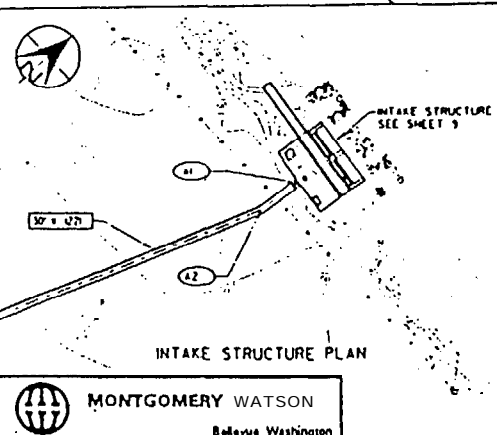
Figure 2

UMATILLA HATCHERY
Site Plan



Section 4, Township 2n, Range 35E

Sheet 2 of 5



Wallowa Hatchery and Satellites (Big Canyon and Little Sheep Ponds)

INTRODUCTION

Wallowa Hatchery is located along Spring Creek, a tributary of the Wallowa River (Grande Ronde River Subbasin), 1 mile west of Enterprise, Oregon. Site elevation is 3,700 feet above sea level. Big Canyon and Little Sheep acclimation facilities are operated as satellites.

There are many types of rearing units at Wallowa Hatchery, including two acclimation ponds and an adult holding pond. The majority of fish production at this facility consists of resident fish. The hatchery is staffed with 3 FTE's. Water rights for the entire hatchery total 23,813 gpm from several sources. The acclimation ponds receive water from Spring Creek.

The Big Canyon acclimation facility is located at the junction of Deer Creek and the Wallowa River, just east of the town of Minam, Oregon. This facility consists of three acclimation ponds and one adult holding pond. Water rights total 5,835 gpm from Deer Creek. The facility is staffed by Wallowa Hatchery personnel from March through May.

Little Sheep Creek acclimation facility is located along Little Sheep Creek, a tributary of the Imnaha River. This facility consists of one acclimation pond and one adult holding pond. Water rights total 8,797 gpm from Little Sheep Creek. The facility is staffed by Wallowa Hatchery personnel from March through May.

PURPOSE

Wallowa began operation in 1920 as a sockeye salmon and resident trout hatchery. In 1985, the hatchery was renovated as part of the Lower Snake River Compensation Program (LSRCP)—a program to mitigate for spring chinook and summer steelhead losses caused by the four federal dams constructed on the lower Snake River.

Wallowa Hatchery is one of six fish production facilities under the LSRCP. It is used for adult collection and spawning, egg incubation and smolt acclimation and release of summer steelhead. (Rearing occurs at Irrigon Hatchery.) The two satellite facilities (Big Canyon and Little Sheep Creek) are used to trap adult summer steelhead and acclimate smolts prior to release. In addition to the LSRCP hatchery programs, Wallowa continues to serve as a rearing facility for rainbow trout.

Rearing Facilities at Wallowa Hatchery and Satellites

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Wallowa										
Acclimation Ponds	300	42	3.5	44,100	2	88,200	Concrete	10	Good	
Adult Holding Pond	80	20	4.5	7,200	1	7,200	Concrete	10	Good	
Adult Trap	25	8.6	4.33	931	1	931	Concrete	10	Good	
Circular Ponds		19	2.5	708	2	1,416	Concrete	45	Fair	
Oval Raceways	47.2	20	3.5	3,000	6	18,000	Concrete	45	Poor	Resident trout
Raceways	100	20	4.5	9,000	2	18,000	Concrete	45	Poor	No longer used
Raceways	100	20	4.5	9,000	5	45,000	Concrete	45	Fair	Resident trout
Starter Tanks	14	4	2.75	154	12	1,848	Concrete	45	Good	
Troughs	15.5	1.17	.6	11	16	176	Wood	45	Fair	No longer used
Vertical Incubators					300		Plastic	10	Good	
Bia Canyon										
Acclimation Pond	70	30	3.5	7,350	1	7,350	Concrete	7	Excellent	
Acclimation Pond	150	30	3.5	15,750	2	31,500	Concrete	7	Excellent	
Adult Holding Pond	30	10	4.5	1,350	1	1,350	Concrete	7	Excellent	
Liffle Sheep Creek										
Adult Holding Pond	40	20	5	4,000	1	4,000	Concrete	7	Excellent	Adult collection
Acclimation Pond	195	50	3.5	34,125	1	34,125	Concrete	7	Excellent	

GOALS

Summer Steelhead: Help meet the LSRCP mitigation goals of producing 2,000 adults for in-place, in-kind mitigation in the Imnaha River System and 9,184 adults for in-place, in-kind mitigation in the Grande Ronde River System.

Rainbow Trout: Provide a resident trout fishery as outlined in the draft Grande Ronde Subbasin Fish Management Plan.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead

Collect 2.27 million eggs for transfer to Irrigon Hatchery.

Acclimate 662,500 smolts (132,500 pounds) from Irrigon Hatchery for on-station release.

Acclimate 375,000 smolts (75,000 pounds) from Irrigon Hatchery for release into Deer Creek (Big Canyon facility).

Acclimate 200,000 smolts (40,000 pounds) from Irrigon Hatchery for release into Little Sheep Creek (Little Sheep Creek facility).

Rainbow Trout

Produce 95,000 legal-sized fish for release into the Grande Ronde System and up to 10,000 fingerlings for release into lakes.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Wallowa Stock Summer Steelhead: Wallowa stock is used as the broodstock for hatchery releases into the Grande Ronde River System. Entry of adults into the subbasin occurs between early February and late May. Peak spawning occurs in April. Fish are collected at both the Wallowa Hatchery and the Big Canyon Acclimation Pond and spawned at Wallowa Hatchery. Eggs are eyed-up at Wallowa Hatchery and then transferred to Irrigon Hatchery for hatching and rearing.

Imnaha Stock Summer Steelhead: Entry of adults into the Imnaha River Subbasin occurs between early March and late May. Adults are collected and spawned at Little Sheep acclimation facility. Eggs are transferred to Wallowa Hatchery for eye-up and then transferred to Irrigon Hatchery for hatching and rearing.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the

hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Wallowa Stock Summer Steelhead: Rear 1,350,000 fish to size of 5 fish/pound at Irrigon Hatchery. Transfer 662,500 smolts to the Wallowa Hatchery acclimation ponds and 375,000 smolts to the Big Canyon acclimation facility. Acclimate smolts at these facilities for approximately four weeks and release during April and May.. Directly release all remaining smolts in April as follows:

- 50,000 smolts into Deer Creek
- 200,000 smolts into the Upper Grande Ronde River
- 62,500 smolts into Catherine Creek

All fish are marked prior to release. A portion of the releases is also coded-wire tagged. Irrigon Hatchery receives credit for these smolt releases.

Imnaha Stock Summer Steelhead: Rear 380,000 fish to size of 5 fish/pound at Irrigon Hatchery. Transfer 280,000 to the Little Sheep Creek acclimation facility; acclimate for a minimum of three weeks; release in late April or May. Directly release the remaining smolts into the Imnaha River (50,000 smolts in April) and Little Sheep Creek (50,000 smolts in late April or May). All fish are marked prior to release. A portion of the releases is also coded-wire tagged. Irrigon Hatchery receives credit for these smolt releases.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Wallowa Hatchery:

Wallowa Stock Summer Steelhead: Adults are collected at Wallowa Hatchery throughout the run from March through May. Most adults collected at this facility are hatchery fish. Fish are also collected at the Big Canyon facility and transported to Wallowa Hatchery for spawning. The trap is opened in late February and closed in late May. Fish are spawned at a 2:3 male-to-female ratio. Any Snake River stock is acceptable for release into the Grande Ronde River System.

Imnaha Stock Summer Steelhead: The trap at the Little Sheep Creek facility is opened from early March to mid-May. Fish are spawned at a 1:1 male-to-female ratio using both wild and hatchery fish. Imnaha stock summer steelhead is the only acceptable stock for release into the Imnaha River System.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in

the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.

- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Wallowa Hatchery and Satellites

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each lot of steelhead. The sample includes a minimum of 10 moribund/dead fish (if available) and 4-6 live fish per lot. Results are reported on the ODFW Fish Examination form and the Lower Snake Compensation Plan monthly report.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. Necropsies on all prespawning mortality (up to 20 fish) are conducted for bacteria, parasites and other causes of death. Additional examinations are conducted if mortality exceeds normal levels. Results are reported on ODFW Viral Examination forms and in the Lower Snake River Compensation Plan monthly report.
- Prior to liberation from acclimation ponds, summer steelhead and spring chinook smolts are given a health exam. This is a special exam that includes aspects of the monthly monitoring exam. Results are reported on ODFW Fish Examination forms and in the Lower Snake River Compensation Plan monthly report.

- Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- If adult spring chinook are held for spawning, they are injected with antibiotics for the control of bacterial diseases.
- Eggs are spawned into colanders to remove ovarian fluid, fertilized, and then water-hardened in iodophor for disinfection.
- Juvenile rainbow trout are administered antibiotics orally, as needed, for the control of bacterial infections.
- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All freshly fertilized eggs are water-hardened in iodophor and transported in iodophor-disinfected buckets. Eggs are fertilized, rinsed, water-hardened and transported in well water. Transport is within three hours of egg disinfection.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between different fish/egg lots and whenever the equipment is transported to and from the satellite facilities.
- Different egg stocks at Wallowa Hatchery are physically isolated from each other by separate incubator rooms and water supplies. Different fish lots are segregated by separate ponds and water supplies.

- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- Total Suspended *Solids* (TSS)—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *Settleable Solids* (SS)—measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- *pH*—measured quarterly when settleable solids are measured.
- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen* (DO)—measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- *Egg and Fry Report*-records all egg and fry movements, treatments, etc.
- *Anadromous Adult Transaction Report*-details the collection and disposition of all adult fish.
- *Monthly Pondered Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.
- *Fish Liberation Reports*-details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*—records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*-document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. MOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Periodic meetings are held with staff from the U.S. Fish and Wildlife Service and appropriate Indian tribes to discuss hatchery operations.

Communication with the General Public

Wallowa Hatchery and the satellite facilities receive approximately 6,000 visitors each year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS-WALLOWA HATCHERY AND SATELLITES

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal¹</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	Wallowa STS Imnaha STS	949 407	1,502 846	1,050-2,059 194-1,872	1
Adult Prespawning Survival	Wallowa STS Imnaha STS	95% 95%	96.7% 97.7%	93.9-97.9% 92.8-99.5%	1
Egg-take	Wallowa STS Imnaha STS	2,416,000 632,000	2,967,398 675,332	2,516K-4,230K 455K-849K	2 2
Green Egg-to-Fry Survival	Wallowa STS Imnaha STS	95% 95%	76.5% 69.5%	71.8-84.8% 63.1-74.6%	2 2
Fry-to-Smelt Survival	Wallowa STS Imnaha STS	95% 95%	N/A N/A	N/A N/A	1,3 1,3
Fish Releases ²	Wallow STS Imnaha STS	N/A N/A	N/A N/A	N/A N/A	
Egg Transfers	Wallowa STS Imnaha STS	1,785,000 480,000	- - ³ - ³	- ³ - - ³	2 2
Fish Transfers	Wallow STS Imnaha STS	N/A N/A	- - ³ - - ³	- - ³ - ³	
Adults Passed Upstream	Wallowa STS ⁴ Imnaha STS ⁵	N/A N/A	160 347	90-236 77-616 ⁶	
Percent Survival	Wallowa STS Imnaha STS		see Irrigon Hatchery see Irrigon Hatchery		1

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Fish releases are credited to Irrigon Hatchery (see Irrigon Hatchery Plan).

³ Not estimated for this report.

⁴ Big Canyon-pass all wild and equal number of hatchery fish.

⁵ Little Sheep-pass 50 percent of wild run and pass three hatchery fish for every two wild fish passed.

⁶ Released above Little Sheep Creek trap.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	STS	N/A	N/A	N/A	1
Acclimation	STS	Yes	Yes	--	1

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	Wallow STS	Yes	Yes	--	
	Imnaha STS	Yes	Yes	--	
Spawning Pop. >500	Wallowa STS	Yes	Partial	--	
	Imnaha STS	Yes	Partial	--	
Spawning Ratio Male:Female	Wallowa STS	2:3	Yes	--	
	Imnaha STS	1:1	Yes	--	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	Wallowa STS	Yes	Yes	--	3
	Imnaha STS	Yes	Yes	--	3

History of Reportable Pathogens-79904995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Wallowa Hatchery</u>	G	S				
CHS/81				+		
CHS/85			IHN	+		IHN in spawning adults
RB/72				+		
STS/56			IHN			IHN in spawning adults
<u>Bia Canyon</u>	N/A	S				
CHS/81				+		
CHS/85				+		
STS/56			IHN			IHN in spawning adults
<u>Little Sheep Ponds</u>	N/A	S				
STS/29			IHN			IHN found in adults

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	1
TSS Max. Effluent	All	<15 mg/L	Yes	--	1
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

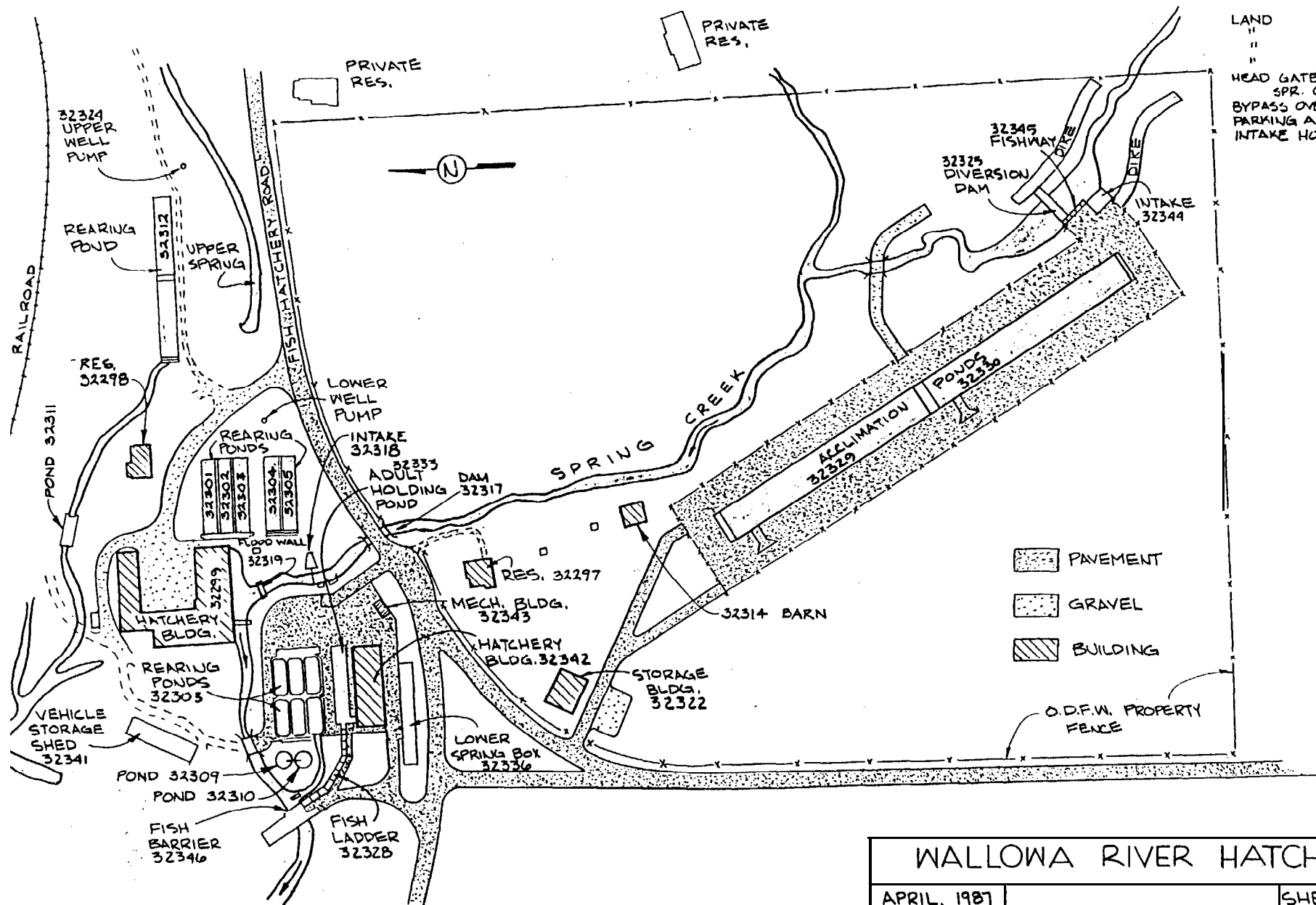
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>				<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Y	e	s	Yes	--	,

Constraints/Comments—Wallowa Hatchery and Satellites

Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. Water flows and water quality are limiting production. Spring Creek is contaminated from agricultural runoff. High turbidity and low dissolved oxygen are also problems. Low flows and high water temperatures in the summer are obstacles to year-round rearing. Ponds often freeze during the winter.
2. Water supply for egg incubation is not adequate for full utilization of all incubators.
3. The deteriorated and leaking trout ponds contribute to the spread of diseases among fish lots.

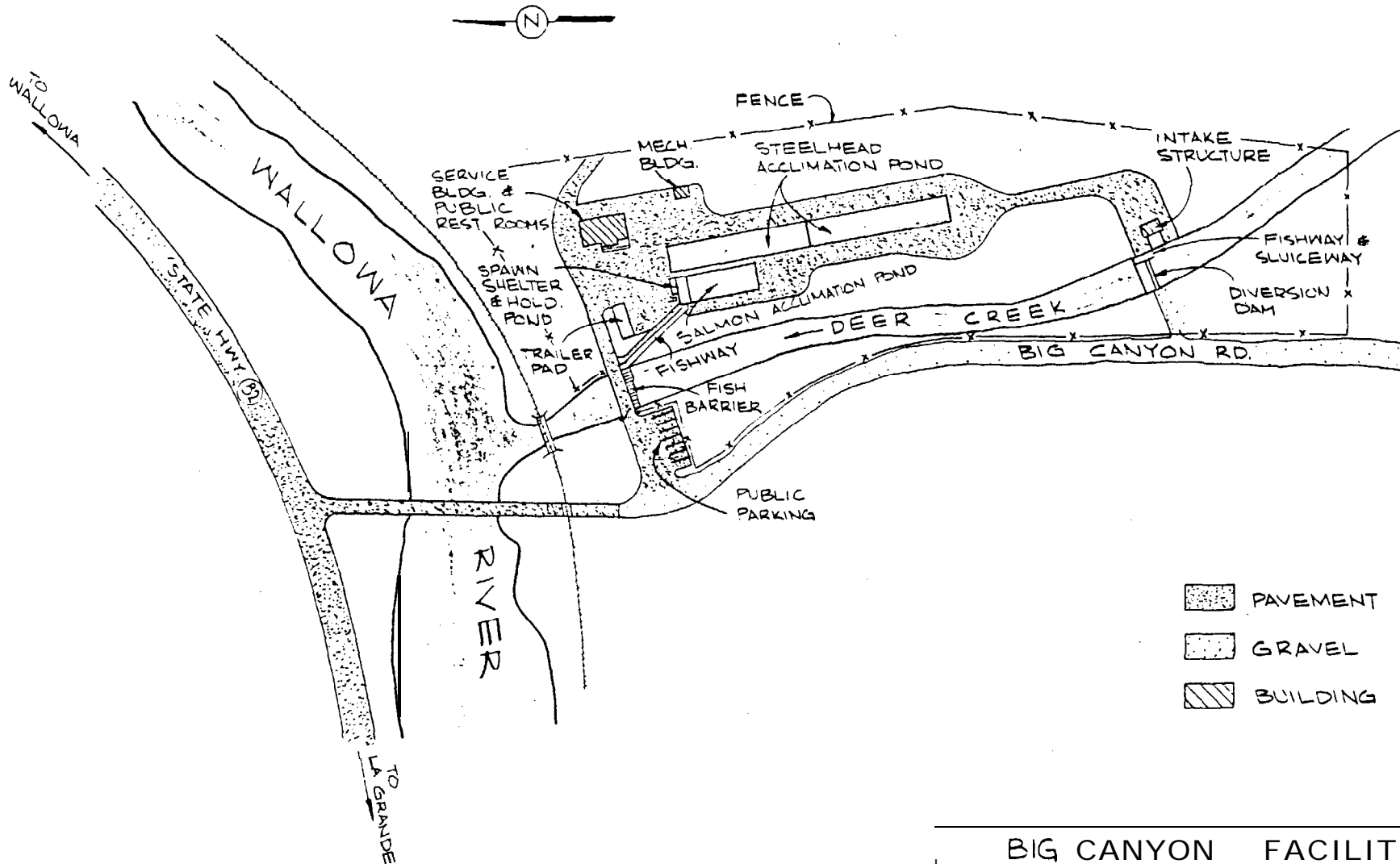





LAND	32331
"	32332
"	32333
"	32334
HEAD GATE @ SPR. CRK	32315
BYPASS OVERFLOW	32316
PARKING AREA	32321
INTAKE HOUSE	32326

WALLOWA RIVER HATCHERY

APRIL, 1987

SHEET 1 OF 1

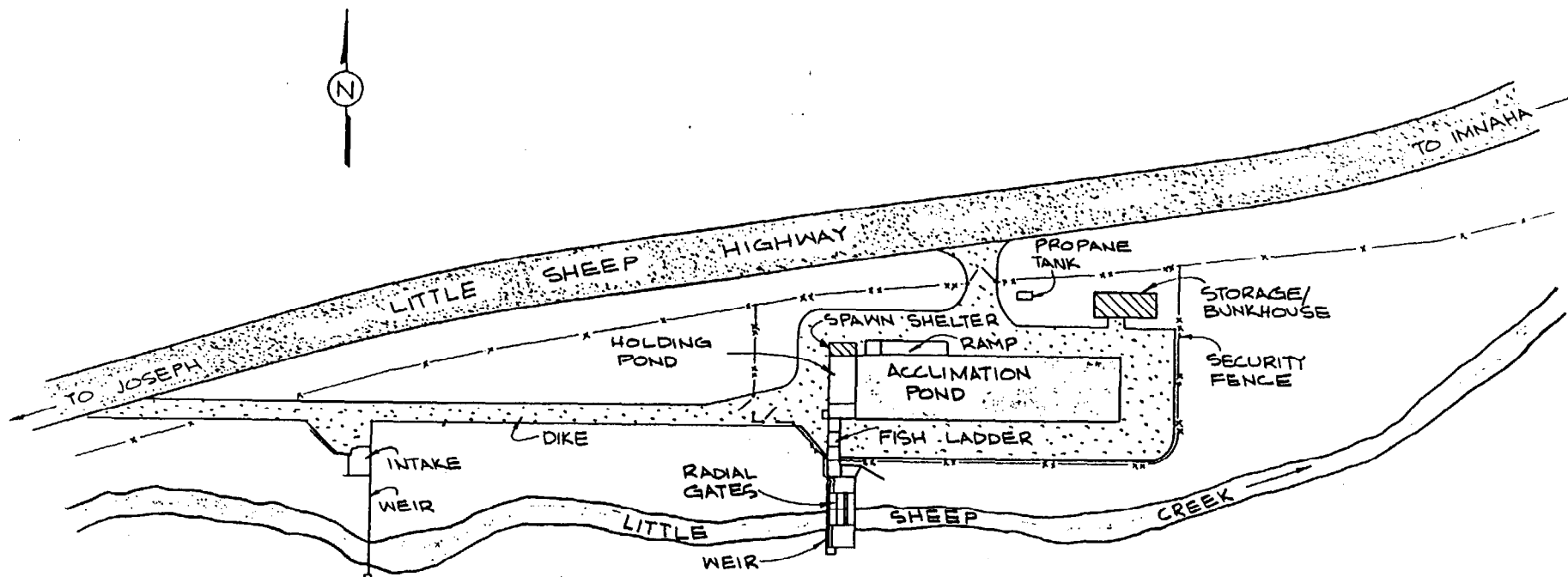





-  PAVEMENT
-  GRAVEL
-  BUILDING

BIG CANYON FACILITIES

MAY, 1987 |

|SHT. 1 OF 1



-  PAVEMENT
-  GRAVEL
-  BUILDING

LITTLE SHEEP CREEK SATELLITE FACILITIES

MAY, 1987

SHEET 1 OF 1

Willamette Hatchery and Satellite (Dexter Ponds)

INTRODUCTION

Willamette Hatchery is located along Salmon Creek, approximately 3 miles upstream from its confluence with the Middle Fork of the Willamette River. Site elevation is 1,217 feet above sea level. The hatchery is staffed with 9.7 FTE's.

The facility rearing units are in fair to good condition and consist of 10 raceways, 40 modified Burrows ponds, 4 circular ponds, 2 adult trout brood ponds, and 1 adult salmon holding pond. The hatchery is basically split into two separate salmon and trout rearing sections. Dexter Holding Ponds, located immediately below Dexter Dam, is operated as a satellite facility.

Water flow available to the hatchery, based on the current water delivery system, ranges from a low of 29,623 gpm to a high 37,028 gpm. Most rearing units receive single-pass water.

Rearing Facilities at Willamette Hatchery and Satellite

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
<u>Willamette</u>										
Adult Holding Pond	250	20	1.9	9,500	1	9,500	Earth/Gravel	55	Fair	
Brood Ponds,	74	26.5	3.5	6,864	2	13,728	Concrete	42	Fair	Resident trout brood
Burrows Ponds	80	20	2.5	3,710	40	14,400	Concrete	43	Fair	
Canadian Troughs	16	2.67	1.75	75	13	975	Fiberglass	8	Good	
Circular Ponds		25	2.1	1,030	4	4,120	Concrete	40	Good	
Raceways	100	20	3.75	7,500	10	75,000	Concrete	42	Fair	Used for trout
Starter Tank	15	5	2.5	188	1	188	Concrete	42	Good	Used for trout
Trough	15.33	1.33	.63	13	1	13	Wood	43	Fair	
Troughs	15.5	1.13	.67	12	21	252	Wood	42	Fair	Used for trout
Vertical Incubators					810		Fiberglass	15	Good	30 are used for trout
<u>Dexter Rearing Ponds</u>										
Adult Holding Pond	75	18	4.5	6,075	1	6,075	Concrete	17	Good	
Raceways	135	18	6	14,580	4	14,580	Concrete	17	Good	
Rearing Pond	172	64	6	66,048	1	66,048	Asphalt	17	Good	

PURPOSE

Willamette Trout Hatchery and the adjacent Oakridge Salmon Hatchery were combined in 1983 and operate today as Willamette Hatchery. The trout hatchery was constructed in 1922 and the salmon hatchery in 1911. The U.S. Army Corps of Engineers (COE) rebuilt the salmon hatchery in 1952 to mitigate for fishery losses caused by Hills Creek, Lookout Point and the Dexter hydroelectric/flood control projects.

Today, Willamette Hatchery is used for adult holding/spawning, egg incubation and rearing of spring chinook and rainbow trout. In addition, both summer and winter steelhead are reared at this facility for a short period of time. The Dexter satellite facility serves as an adult collection, rearing and acclimation release site for spring chinook and summer steelhead. In addition, BPA is funding an oxygen supplementation research project. All facilities are funded with state and federal revenues.

GOALS

Spring Chinook and Summer Steelhead: The COE mitigation agreement requires an annual production of no more than 235,000 pounds of juvenile chinook salmon and steelhead. The hatchery production contributes to three spring chinook programs. The goals of these programs are to:

- Return an annual average run of 11,250 spring chinook to the Middle Fork Willamette River Subbasin.
- Provide a potential harvest of 200 spring chinook adults in the Santiam River mainstem and 1,300 adults in the South Santiam River.
- Re-establish a run of 750 naturally produced spring chinook adults in the Molalla River System.
- Goal for the Middle Fork Willamette River is to provide a diversity of angling opportunities with an annual sport catch of 2,250 adult summer steelhead.

Rainbow Trout: Meet subbasin management objectives for three ODFW fishery districts.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Provide 20,900 eggs to CEDC, Oregon's Salmon and Trout Enhancement Program and research.

Produce 301,000 smolts (21,500 pounds) for transfer to South Santiam Hatchery.

Produce 858,000 fingerlings (8,520 pounds) and 556,000 smolts (47,085 pounds) for transfer to Dexter Ponds.

Release 958,000 smolts (113,000 pounds) from Dexter Ponds into the South Santiam River.

Provide 10,000 smolts (1,000 pounds) for ODFW research.

Produce 10,000 smolts (670 pounds) for transfer to the National Marine Fisheries Service research in Newport, Oregon.

Produce 1,300,000 fingerlings (13,000 pounds) for release into Fall Creek, Hills Creek and Lookout Point reservoirs.

Produce 1,369,000 smolts (153,945 pounds) for release into the Middle Fork Willamette River.

Winter Steelhead

Produce 85,000 smolts (14,167 pounds) for release into the Siuslaw River.

Summer Steelhead

Produce 118,000 smolts (26,222 pounds) for release into the Middle Fork Willamette River.

Rainbow Trout

Produce 208,000 legal-sized fish (69,400 pounds) for release into lakes, streams and reservoirs (Cape Cod stock).

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

- Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.
- Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices associated with anadromous fish production at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

It is also important to note that the Oregon Fish and Wildlife Commission recently adopted a Wild Fish Management Policy, a Natural Production Policy, and a Hatchery Fish Gene Resource Management Policy to help guide the management of wild and hatchery fish in Oregon. These policies are currently being implemented and will likely change future brood collection, and rearing and release strategies for some fish stocks. Therefore, until these policies are fully implemented, the hatchery operations outlined in this report represent the interim practices currently used at this facility.

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: Adults arrive from May to October. Peak spawning occurs during late September. Adults are collected at Dexter Rearing Pond and trucked to Willamette Hatchery for holding and spawning.

Summer Steelhead: No adult collection occurs at this hatchery. Fish are normally received as fingerlings from Leaburg Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Spring Chinook

- Rear 775,000 fish to a size of 9 fish/pound and release off-station (nonacclimated) into the Middle Fork Willamette River (near Dexter Ponds) in mid-March. A portion of this release is coded-wire tagged.
- Rear 1250,000 fish to a size of 100 fish/pound and release off-station (nonacclimated) into Fall Creek Reservoir (1,000,000) and Lookout Point Reservoir (250,000) in mid-May.
- Rear 77,000 fish to a size of 8 fish/pound at Dexter Ponds; release on-station into the Middle Fork Willamette River in November. A portion of this release is coded-wire tagged.
- Rear 378,000 fish to a size of 9 fish/pound at Dexter Ponds; release on-station into the Middle Fork Willamette River in mid-March. A portion of this release is coded-wire tagged.
- Rear 234,000 fish to a size of 8 fish/pound at Dexter Ponds; release off-station (nonacclimated) into the South Santiam River in November. A portion of this release is coded-wire tagged.
- Rear 234,000 fish to a size of 8 fish/pound at Dexter Ponds; release off-station (nonacclimated) into the South Santiam River in March. A portion of this release is coded-wire tagged.

- Rear 250,000 fish to a size of 9 fish/pound at Dexter Ponds; transfer to South Santiam Hatchery in February for acclimation and release on-station into the South Santiam River in March. A portion of this release is coded-wire tagged.

Summer Steelhead: Transfer fish from Leaburg Hatchery to Dexter Ponds; rear 115,000 fish to a size of 4.5 fish/pound and release on-station into the Middle Fork Willamette River in April. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Oregon's recently adopted Wild Fish Management Policy and Hatchery Fish Gene Resource Management Policy will likely change future broodstock selection and spawning protocols for some fish stocks. Until these policies are fully implemented, the following interim practices are currently being used at Willamette Hatchery:

Spring Chinook: Adults are collected throughout the run. Most adults are collected during the middle of the run with smaller numbers collected at the early and late portions of the run. The annual spawning population is large enough to maintain a 1:3 male-to-female spawning ratio. The majority of the run is comprised of hatchery fish. Willamette, McKenzie and South Santiam spring chinook stocks are all acceptable stocks for use at Willamette Hatchery.

Summer Steelhead: No spawning occurs at this facility (see Leaburg Hatchery Plan). The Skamania summer steelhead stock is acceptable for use at Willamette Hatchery.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-AN Stocks

The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs (conducted by the ODFW Nutrition Section) and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy which restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress which can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size.

A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Willamette Hatchery/Dexter Ponds

Health Monitoring

- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery. The sample includes a minimum of 10 dead fish (if available) and 4-6 live fish per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. Necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit.
- *Whenever abnormal behavior or mortality is reported or observed, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Oregon Administrative Rules fish disease control policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Oregon Administrative Rules fish disease control policy.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs are water-hardened in iodophor for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections.

- Formalin is dispensed into water for control of parasites and fungus on eggs, juveniles and adult salmon. Treatment dosage and exposure time varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration (FDA) or those classified by FDA as “low regulatory priority” are used for treatments.

Sanitation

- All **eggs** brought to Willamette Hatchery are surface-disinfected with iodophor.
- All equipment (i.e., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots.
- Different lots of fish and eggs are physically segregated from each other by separate ponds, incubator units and water supplies.
- Fish transport trucks are disinfected between the hauling of different fish lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Oregon Department of Environmental Quality. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

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- *pH*—measured quarterly when settleable solids are measured.

- *Water Temperatures*-daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries.
- *Dissolved Oxygen (DO)*-measured only when conditions warrant (e.g., periods of low flows and high temperatures).
- *Air Temperatures*-maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- *Flow Logs*-changes in water flows through the hatchery ponds are recorded whenever flows are altered for hatchery management activities (i.e., ponding of fish, splitting of fish lots, fish releases, etc.).

Objective 6: Communicate effectively with other fish producers, managers and the public.

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- *Monthly Poned Report*-updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- *Mark Recovery Report*-details sex, fish length and tag information from all marked adult fish that are captured.
- *Length Frequency Record*-details fish lengths of all anadromous fish released (based on a sample of the releases).
- *Fish Loss and Treatment Report*-records disease problems and daily mortality.

- *Fish Liberation Reports*—details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- *Trap and Barrier Log*-records whenever any fish trap or barrier is activated or closed.
- *Visitor Log*-some facilities record the daily visitor use of the facility; however, this is not a requirement.
- *Monthly Progress Report*—document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).

Hatchery Management Information System (HMIS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Coordinated Information System (CIS): Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (MOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Communication with the General Public

Willamette/Dexter facilities receive approximately 20,000 visitors each year. The hatchery also conducts numerous tours and presentations to schools and other groups and participates in local fairs, Free Fishing Day activities and other public outreach activities.

PERFORMANCE STANDARDS—WILLAMETTE HATCHERY AND SATELLITE

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u> ¹	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHS	3,000	9,869	6,397-17,928	1,4
	STS	N/A	N/A	N/A	
Adult Prespawning Survival	CHS	95%	88.8%	87.5-93.1%	1,4
	STS	N/A	N/A	N/A	
Egg-take	CHS	4,700,000	3,237,023	1,740K-5,810K	4
	STS	N/A	N/A	N/A	
Green Egg-to-Fry Survival	CHS	95%	80.8%	62.0-89.8%	2
	STS	N/A	N/A	N/A	
Fry-to-Smolt Survival	CHS	95%	87.8%	82.7-90.8%	2
	STS	N/A	N/A	N/A	
Fish Releases	CHS	1,946,000	2,176,890	1,878K-2,422K	3
	STS	115,000	89,523 ²	30K-120K	
	STW	85,000	N/A	N/A	
Egg Transfers	CHS	431,000	— ³	— ³	
	STS	0	— ³	— ³	
Fish Transfers	CHS	301,000	390,000	296K-574K	
	STS	0	— ³	— ³	
Adults Passed Upstream	CHS	N/A	N/A	N/A	
	STS	N/A	N/A	N/A	
Percent Survival	CHS	N/A	1.21%	0.70-2.08%	
	STS	N/A	Unknown	Unknown	

N/A=Not applicable.

¹ Based on 1994 fish production goals.

² Data for two years only.

³ Not estimated for this report.

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS	8.0-14.0	9.6	7.1-12.3	2
	STS	4.5	4.5	4.4-4.6	
Acclimation	CHS	Partial	Partial	--	
	STS	Yes	Partial	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHS	Yes	Yes	—	1,4
	STS	N/A	N/A	N/A	
Spawning Pop. >500	CHS	Yes	Yes	—	4
	STS	N/A	N/A	N/A	
Spawning Ratio Male:Female	CHS	1:2	Yes	--	4
	STS	N/A	N/A	N/A	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHS	Yes	Yes	--	
	STS	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Willamette Hatchery</u>	S	S				
CHS/22				+	+	(adults)
CHS/23				+		
CHS/24				+		
RB/53						CWD No longer reared
RB/57						No longer reared
RB/72				+		CWD
STS/24				+		
STW/38						
STW/43						CWD
<u>Dexter Ponds</u>	N/A	s				
CHS/22				+	+	(adults)
CHS/23						
CHS/24				+		EIBS
STS/23						CWD

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the Oregon Department of Fish and Wildlife.)

Objective 5

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
TSS Effluent	All	<5 mg/L	Yes	--	
TSS Max. Effluent	All	<15 mg/L	Yes	--	
SS Effluent	All	<0.1 ml/L	Yes	--	
SS Max. Effluent	All	<0.2 ml/L	Yes	--	
Downstream Temp	All	Varies	Yes	--	
pH	All	6.0-9.0	Yes	--	
Continuous Monitoring of Other Parameters	All	Yes	Yes	--	

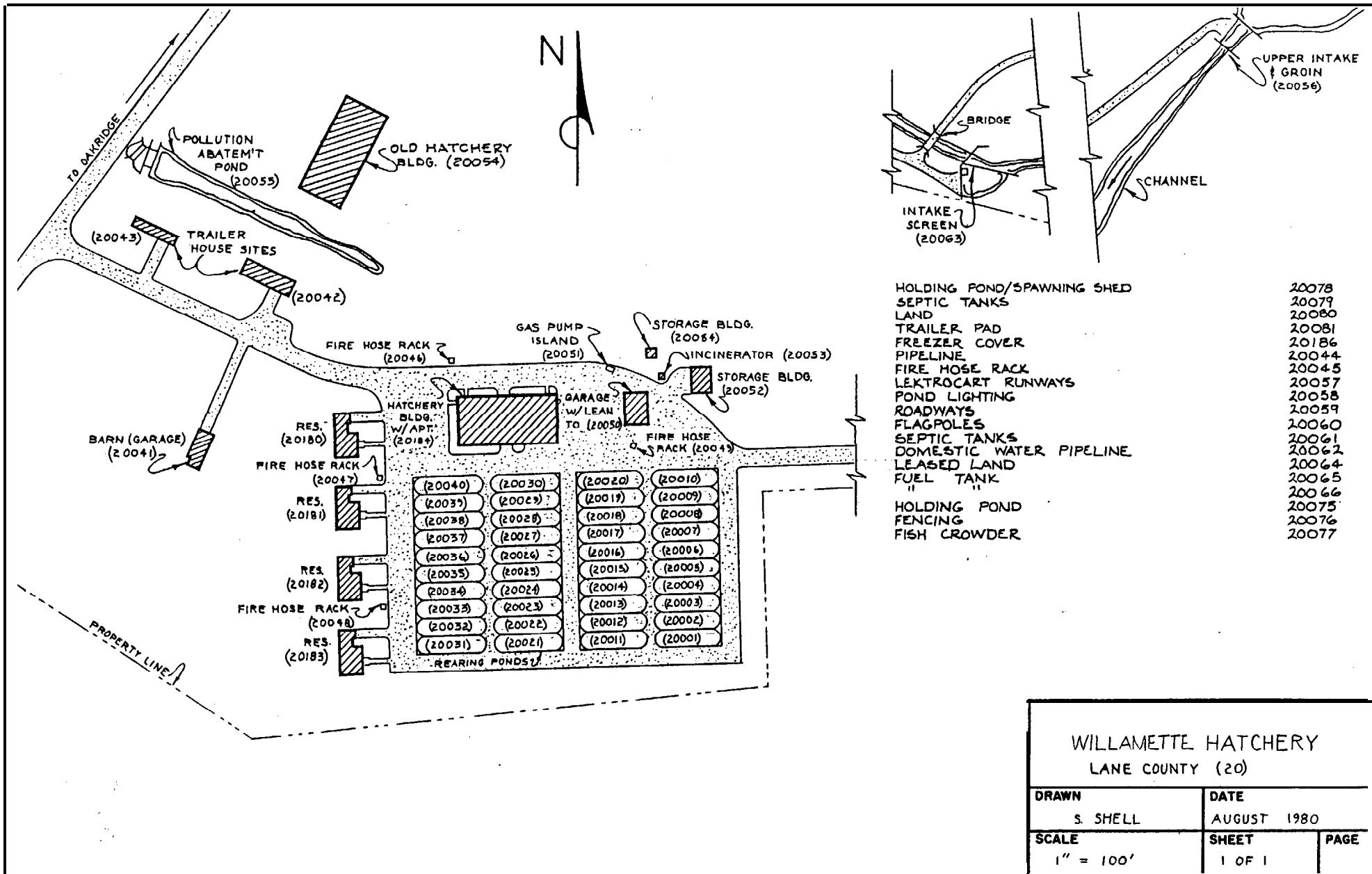
Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	—	

Constraints/Comments—Willamette Hatchery and Satellite

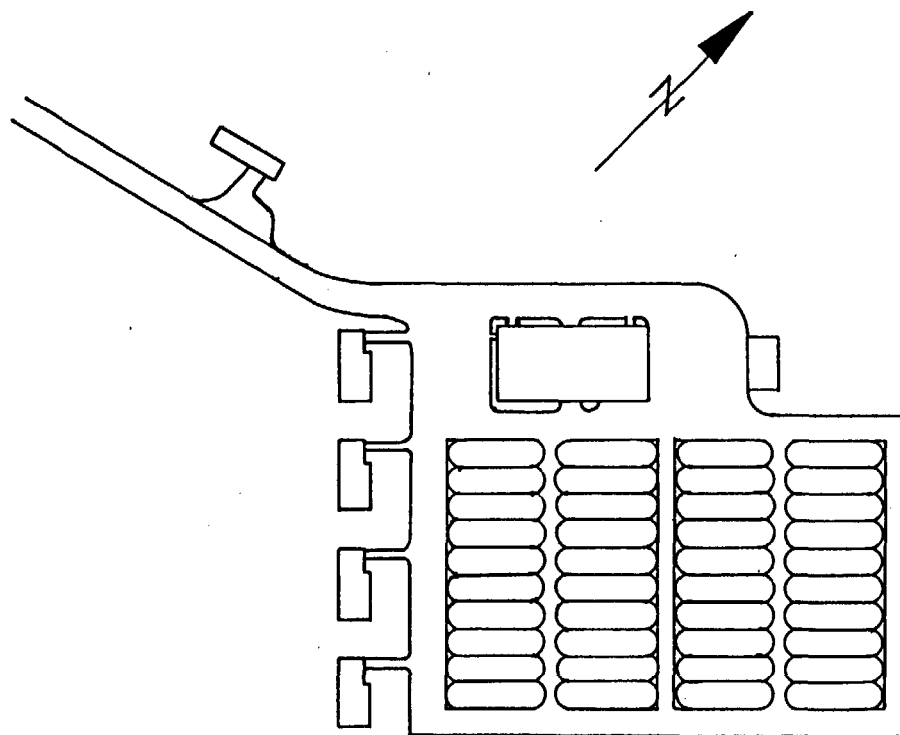
Correcting the following constraints will enable the hatchery staff to better implement ODFW policies:

1. There are possible flow restrictions in September/October.
2. Mud and silt load in the water supply can be severe. Debris on the intake screens in the fall and early winter can restrict flow to the rearing ponds.
3. There is no capability for on-site releases.
4. Need sorting pens in the adult holding pond and a larger sorting/spawning area at the hatchery.
5. Diversion dam integrity threatens water supply.
6. Stability of bank protection project threatens portion of hatchery facility.



WILLAMETTE HATCHERY LANE COUNTY (20)

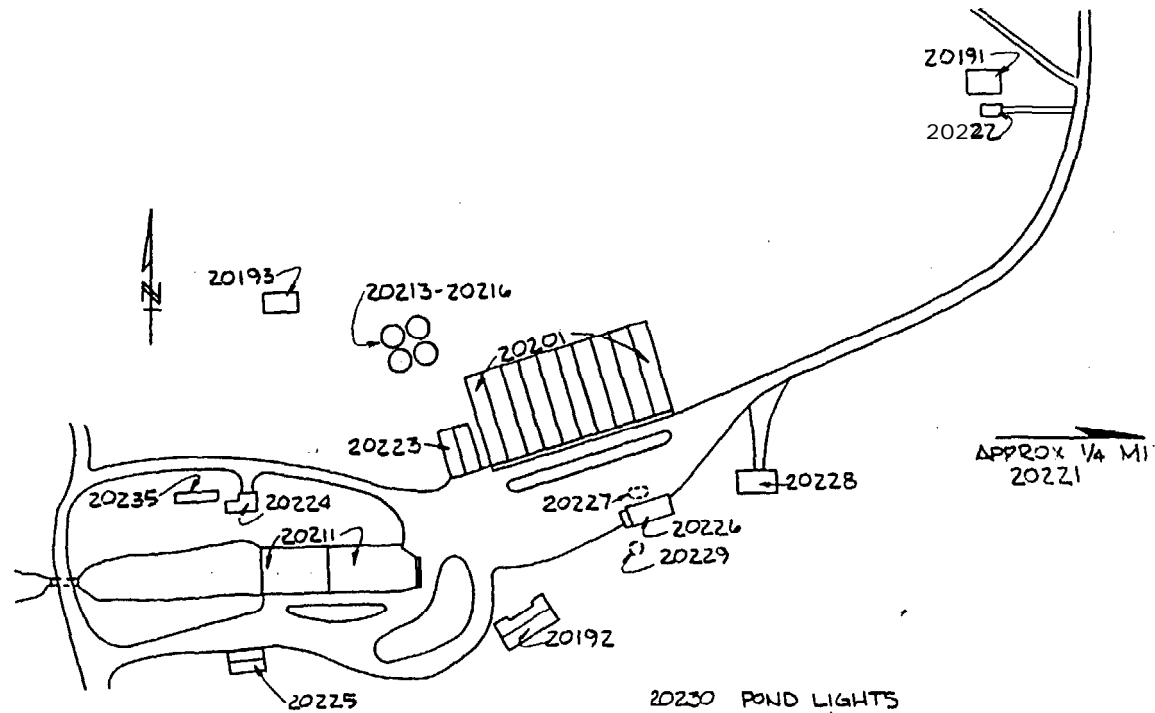
DRAWN S. SHELL	DATE AUGUST 1980	
SCALE 1" = 100'	SHEET 1 OF 1	PAGE



OAKRIDGE HATCHERY

DRAWN J. IRVIN

SCALE 1"=100'



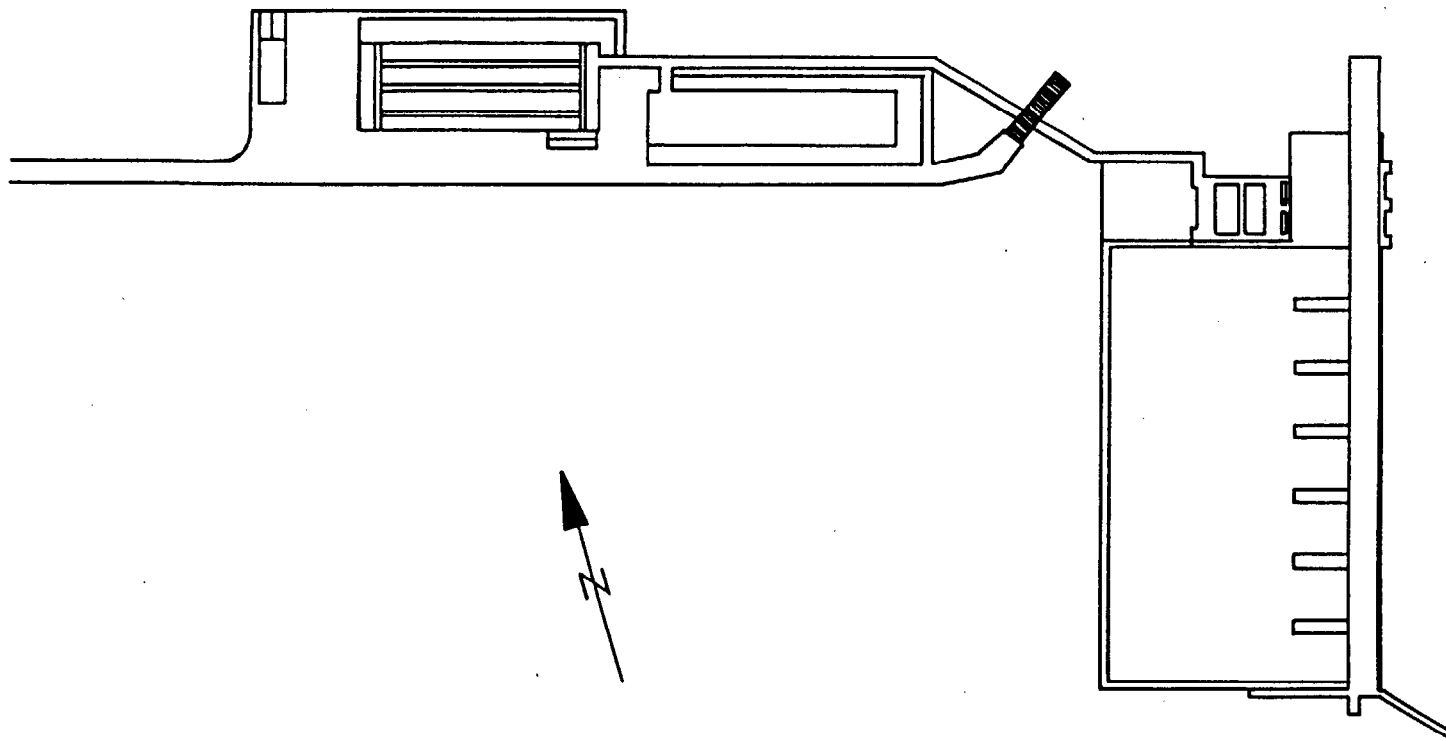
- 20230 POND LIGHTS
- 20231 ROADS/WALKS
- 20232 PIPELINE
- 20233 LANDSCAPING
- 20234 GROUNDS IMPROVEMENTS
- 20236 MOBILE HOME PAD
- 20199 POND WALKWAY

WILLAMETTE HATCHERY

D. WYSS

FEB 4, 1991

1"=100'



DEXTER FISH FACILITIES

DRAWN J. IRVIN

SCALE 1"=100'

INTEGRATED
HATCHERY
OPERATIONS
TEAM



U.S. Fish and Wildlife Service Hatchery Operation Plans

Eagle Creek National Fish Hatchery

INTRODUCTION

Eagle Creek NFH is located 40 miles east of Portland, Oregon along Eagle Creek, a tributary of the Clackamas River. The hatchery is situated on about 25 acres of bottomland in a deep canyon. Site elevation is 950 feet above sea level.

The hatchery currently consists of 75 standard raceways divided into upper and lower sections, 1 adult holding pond and 10 starter tanks. The adult holding pond is used for rearing from March 15-May 20. A small hydropower plant has been constructed at the intake on Eagle Creek. Power can only be generated when flows exceed hatchery production requirements. Revenue is used to offset electrical costs.

Water rights total 116,730 gpm (260 cfs), almost all from Eagle Creek. A spring is used for egg incubation and a well for domestic water use. Approximately 67,325 gpm (150 cfs) of the water right is for power generation and is not used for fish culture. There is not enough water during low flow periods to provide the entire water right so power generation only occurs during high flows. Flow from Eagle Creek available for hatchery use ranges from 6,000 gpm to 25,146 gpm. All rearing units are supplied with serial re-use water. The hatchery is staffed with 8 FTE's.

Rearing Facilities at Eagle Creek National Fish Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Brood pond	144	72	4	41,472	1	41,472	Concrete	39	Poor	Walls/bottom shifting
Lower raceway	60	6	2.5	1,600	39	62,400	Concrete	39	Good	
Upper raceway	80	6	2.5	1,600	36	57,600	Concrete	31	Good	Bottom sags
Heath incubators					43			26	Fair	Stacks/l 6 trays each
Starter tanks	16	3	2	96	10	960	Fiberglass	16	Good	

PURPOSE

Eagle Creek NFH was authorized under the Mitchell Act and currently operates as part of the Columbia River Fisheries Development Program-a program to provide for the conservation of Columbia River fishery resources. Facilities were first constructed in 1956 and expanded in 1964 and 1975. The hatchery is currently used for adult collection, egg incubation and rearing of coho and winter steelhead for on-

station release. It also produces coho salmon for use in Oregon's Youngs Bay Net Pen Program and for restoration goals on Tribal lands.

GOALS

Produce coho and winter steelhead to help compensate for fish losses in the Columbia River Basin caused by mainstem dams.

OBJECTIVES

Objective 1: Hatchery Production

Coho

Produce 1 million smolts for on-station release.

Produce 1 million smolts for transfer to net pens in Youngs Bay.

Produce 1 million fingerlings for transfer to the Yakama Indian Nation.

Winter Steelhead

Produce 200,000 smolts for on-station release.

Produce 20,000 yearlings for transfer to net pens at Oregon City.

Produce 70,000 fry for transfer to Clackamas Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other salmon producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Coho: Adults return to Eagle Creek from September to November. Fish returning directly to the hatchery holding pond are spawned in October and November.

Winter Steelhead: Adults return to Eagle Creek from November to April. Fish returning directly to the hatchery holding pond are spawned from December to mid-March.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding): Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Rearing smolts on parent river water can help reduce straying when they return as adults as well as increase their survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond. The specific rearing and release strategies used at this hatchery are detailed below.

Coho: Rear 1 million fish to a yearling smolt size of 12 fish/pound and volitional release directly into Eagle Creek from March 15 to May 20. Rear 1 million fish to a yearling smolt size of 12 fish/pound and transfer to net pens in Youngs Bay. Rear 1 million fish to 100/pound for transfer to the Yakama Indian Reservation. There are no fry released directly from this station into Eagle Creek.

Winter Steelhead: Rear 200,000 fish to a yearling smolt size of 5 fish/pound for release directly into Eagle Creek in April. Transfer 14-month-old yearlings (20,000) to net pens in Oregon City. Transfer 70,000 fry at 200/pound in July to ODFW. There are no fry released directly from this station into Eagle Creek.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection-All Stocks

If more fish return to the hatchery than are needed for broodstock, excess fish are randomly selected and removed throughout the run. Carcasses of coho salmon are utilized by the Warm Springs and Yakama Indian Reservations. Steelhead trout are spawned live, tagged, transported and released into the lower Clackamas River. Some steelhead are sacrificed for disease analysis.

Spawning Protocol-All Stocks

Fish are randomly selected and spawned at a 1:1 male-to-female ratio. Jacks are spawned at 1% of the spawning population. When excess eggs are taken, a portion of eggs from each female is kept for on-station rearing. The remaining eggs are either destroyed or transferred for use in other programs where acceptable.

Acceptable Stocks

If numbers of returning broodstock are insufficient to meet the hatchery production goals, the coho production may be achieved using Sandy River, Klaskanine, Big Creek, Bonneville, Toutle River, or Willard stocks, in that order of preference. Steelhead production can be met using Clackamas River stock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at USFWS hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

The USFWS has Fish Health Policy and Implementation Guidelines as well as disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies to diagnose the cause of fish loss.
- Prescribe appropriate treatments and remedies to disease.
- Follow USFWS Fish Health Policy and Implementation Guidelines for restrictions on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs and environmental conditions in the hatchery rearing container based on historical disease events. It may also involve the prophylactic use of vaccines in order to prevent a disease problem.
- Follow USFWS Fish Health Policy and Implementation Guidelines on the introduction of stocks into a facility which may result in the introduction of a new disease condition or mortality.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index) to help optimize the quality of the aquatic environment and minimize fish stress which can induce infectious and noninfectious diseases. For example, the Density Index is used to estimate the maximum number of fish (of a given length) that can occupy a rearing unit based on the rearing unit's size. The Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Eagle Creek NFH

Health Monitoring

- On at least a monthly basis, both healthy and clinically diseased fish from each fish lot are given a health exam. This sample includes a minimum of 10 fish per month per lot.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleens are examined for pathogens from each species.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit. This sample consists of a minimum of 60 fish per lot.
- Whenever abnormal behavior or mortality is observed, the fish health specialist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor as a disinfectant.
- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections.
- Formalin (37% formaldehyde) is dispensed into water for the control of fungus on eggs and the control of parasites on juvenile salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration or those under Investigative New Animal Drug permits are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor as per the USFWS Fish Health Policy.
- All equipment (nets, tanks, pond brushes) is disinfected with iodophor between different fish/egg lots.
- Different fish lots are physically distinct and kept in separate ponds or incubation units.
- Tank trucks or tagging trailers are disinfected when brought onto the station.
- Foot baths containing iodophor are strategically located on the hatchery grounds (i.e., entrance to hatchery building) to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at USFWS facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery:

- *Total Suspended Solids (TSS)*—Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.
- *Settleable Solids (SS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.
- *In-hatchery* Water Temperatures-maximum and minimum daily.
- *In-hatchery Dissolved Oxygen*—as required by stream flow or weather conditions.

Objective 6: Communicate effectively with other salmon producers and managers.

Coordination/Communication within USFWS

The hatchery holds quarterly hatchery evaluation team meetings involving hatchery, management, and fish health staff. Cooperators and other interested parties are invited to hear reports on the accomplishments, review plans, and present management programs that might affect, or be affected by hatchery operations. The hatchery evaluation team produces broodyear reports to monitor our progress at meeting hatchery objectives. These meetings also serve as a forum to share technical information. Production goals are set by the hatchery evaluation team and coordinated with the co-managers through the Production Advisory Committee, with concurrence of the Regional office.

Interagency Coordination/Communication

The USFWS hatchery managers communicate through the regional “Fishery Resource Offices,” and a basin-wide “Columbia River Fisheries Program Office” that participates in the following forums:

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

This station reports through the Columbia River Information System (CRIS) of the U.S. Fish and Wildlife Service. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS—EAGLE CREEK NATIONAL FISH HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	COH STW	4,000 500	2,766 797	550-5,724 251-1 ,346	
Adult Prespawning Survival	COH STW	95% 95%	95% 94%	93-96% 94-95%	
Egg-take	COH STW	3.6M 900K	2.0M 1.2M	0.5M-3.2M 575K-2.1M	2
Green Egg-to-Fry Survival	COH STW	95% 95%	95% 95%	94-98% 94-95%	
Fry-to-Smolt Survival	COH STW	90% 95%	90% 93%	89-91% 86-96%	1
Fish Releases	COH STW	1.0M 200K	2.0M 200K	1.8M-3.4M 200K	
Egg Transfers	COH STW	0 0	-- ¹ — ¹	-- ¹ — ¹	
Fish Transfers	COH STW	2.0M 90,000	— ¹ — ¹	— ¹	
Adults Passed Upstream	COH STW	0 0	0 0	0 0	
Percent Survival	COH STW	N/A N/A	3.63% 0.48%	0.20-1 2.21% 0.18-0.77%	3 3

N/A=Not applicable.

¹ Not estimated for this report,

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	COH	12	4.6	10-15	
	STW	5	6.7	5.4-7.8	
Acclimation	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Volitional Release	COH	Yes	No	--	
	STW	Partial (60%)	No	--	

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Pop. >500	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Ratio Male:Female	COH	1:1	2:2	2:2	
	STW	1:1	2:2	2:2	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	COH	Yes	Yes	--	
	STW	Yes	Yes	--	

History of Reportable Pathogens-7990-1995

<u>Species/Stock</u>	<u>Water Supply</u> <u>Inc.</u>	<u>Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./</u> <u>ERM</u>	<u>Other/Comments</u>
<i>Eaale Creek Hatchery</i>	G,SR	SR				
COH/Eagle Creek				+	Furunc. (adult)	CWD <i>C. shasta</i> (adult)
COH/Toutle River				+		CWD
COH/Sandy River						CWD from 1990
COH/Clackamas						CWD 1990 only
COH/Klaskanine				+		CWD 1993-95
COH/Kalama						CWD 1991
COH/Cascade- Bonneville						CWD 1994-95
COH/Oxbow					Furunc. (adult)	Not recent
COH/Big Creek						1991 Not recent
STW/Eagle Creek				+		
CHS/Eagle Creek				+	Furunc. (adult)	Until 1992

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the U.S. Fish and Wildlife Service.)

Objective 5

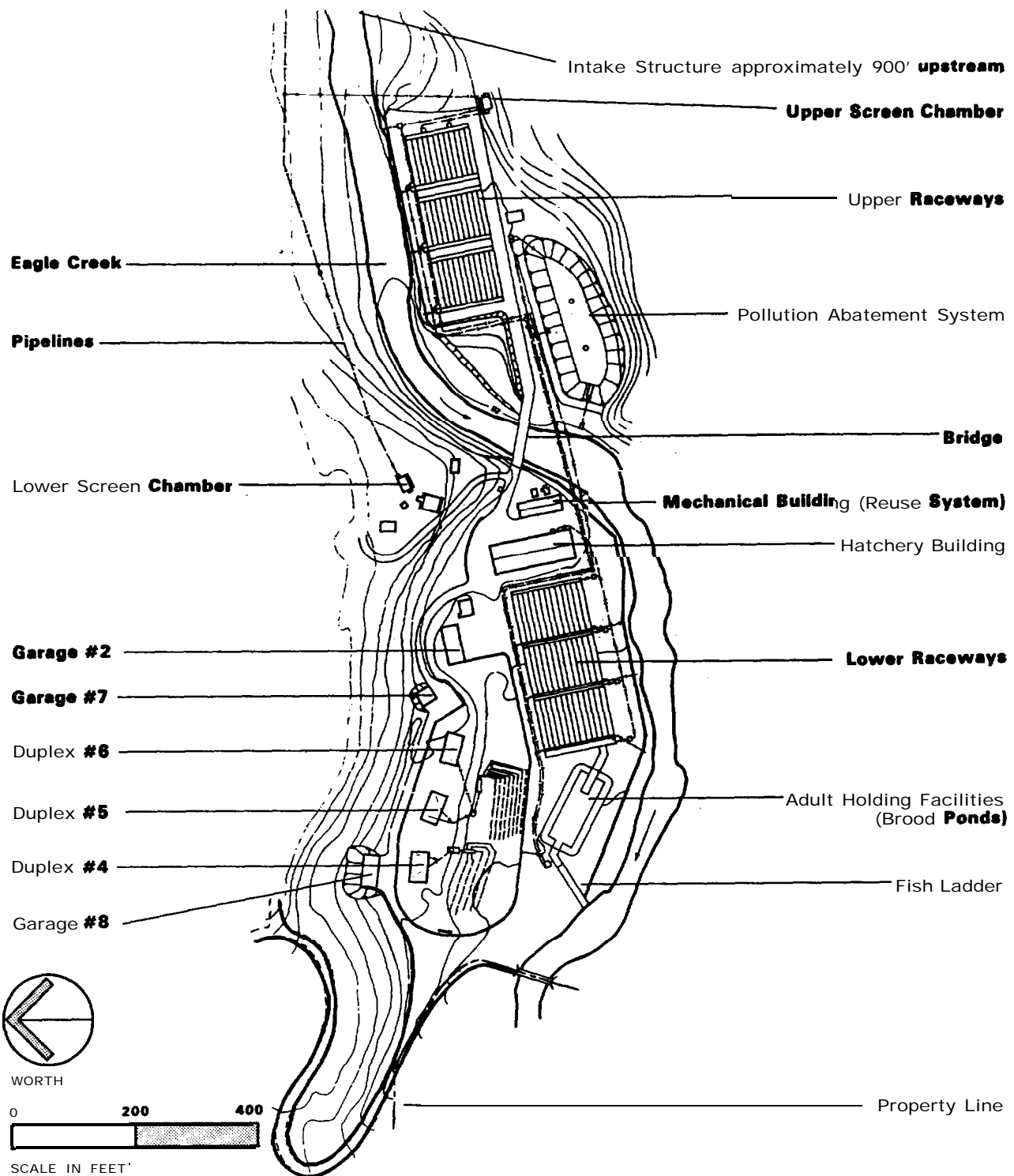
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Meet Requirements of NPDES Permit	All	Yes	Yes	—	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal 5-Year Average</u>		<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Doc.	All	Yes	No	--	4
Develop and Review Future Brood Doc.	All	Yes	Yes	--	
Develop and Review Current Brood Doc.	All	Yes	Yes	--	

Constraints/Comments-Eagle Creek National Fish Hatchery

1. Poor water quality in some years has decreased fish survival.
2. The amount of incubation water and number of incubators prohibit individual incubation.
3. Tag data for coho salmon from 1980, 1981, 1988, 1989, 1990 broodyears.
Tag data for winter steelhead trout from 1989 and 1990 broodyears.
Survival is from juvenile release to total estimated recoveries in fishery and rack returns. Adult recoveries include return of all age classes.
4. The Equilibrium Brood Document has not been completed at this time.

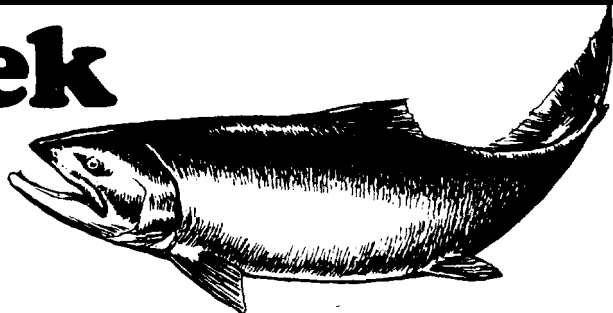


Eagle Creek

NATIONAL FISH HATCHERY
STATION DEVELOPMENT PLAN

EXISTING FACILITIES

REGION ONE U.S. FISH AND WILDLIFE SERVICE



Warm Springs National Fish Hatchery

INTRODUCTION

Warm Springs NFH is located on the north bank of the Warm Springs River, approximately 14 miles north of Warm Springs, Oregon. The hatchery site is leased by the federal government from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO). Site elevation is 1,525 feet above sea level.

Rearing units consist of 2 adult holding ponds, 3 adult catch ponds, 20 Burrows ponds, 20 converted Burrows ponds and 20 starter tanks. The facility is staffed with **6.0FTE's**.

All water rights on the Warm Springs River are the property of the CTWSRO. Nonconsumptive water use is included in the business lease between CTWSRO and the U.S. Fish and Wildlife Service (USFWS). The lease specifies use of approximately 100 cfs (44,883 gpm) from the Warm Springs River. Water is supplied by pumping from the Warm Spring River. Water use ranges from 9,000 gpm to 18,000 gpm. All rearing ponds are supplied with single-pass water. An advance engineering plan is being developed for a re-use/ ozone water supply/ disinfection system.

Rearing Facilities at Warm Springs National Fish Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Catch pond	28	8	3	672	3	2,016	Concrete	18	Good	1 additional pond occupied by a denil pass and tag detector
Brood pond	48	26	6	4,200	1	4,200	Concrete	15	Good	Oval shape, slanting sides
Brood pond	50	26	6	4,400	1	4,400	Concrete	15	Good	Oval shape, slanting sides
Burrows raceways	75	16	1.7	2,000	20	40,000	Concrete	25	Good	
Converted burrows	75	8	1.7	1,000	20	20,000	Concrete	25	Good	
Heath incubators					16			19	Good	16 stacks of 16 trays each
Starter tanks	13	3	2	78	20	1,560	Fiberglass	15	Good	

PURPOSE

Warm Springs NFH was authorized in 1966 and began operating in 1978. The Confederated Tribes of the Warm Springs Reservation of Oregon entered into an agreement with the U.S. Fish and Wildlife Service to stock the waters of the Warm Springs Indian Reservation with salmon and trout to increase fishing opportunities. The facility is used for adult collection, egg incubation and rearing of spring chinook salmon. The CTWSRO has the sole management responsibility for the fishery resources on the reservation.

GOALS

Produce spring chinook salmon that will contribute to the CTWSRO fishery while providing adequate escapement for hatchery production. The USFWS and CTWSRO have an agreement to assure that hatchery operations are compatible with the CTWSRO's fishery management goals.

OBJECTIVES

Objective 1: Hatchery Production

Produce 750,000 spring chinook smolts for on-station release.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other salmon producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Adult spring chinook arrive at the hatchery from mid-April through September. Adults are captured at the hatchery weir. Since 1987, the trap and weir at the hatchery have been operated to allow only wild spring chinook upstream of the weir. Hatchery stock are retained at the hatchery for broodstock or distributed to CTWSRO. In addition, when 1,200 wild adult fish are expected to be passed upstream of the hatchery, a minimum of 70 wild fish are kept for incorporation into the hatchery broodstock. These actions are done to help promote the retention of wild genetic traits in the hatchery broodstock and ensure the genetic integrity of wild fish by allowing sufficient escapement upstream of the hatchery.

In 1995 a passage system was installed to detect coded-wire tagged hatchery fish. When operational, hatchery fish will be shunted into the holding pond. Non-tagged (wild) fish will be monitored by video technology and then directed to the fish ladder to continue their upstream migration. Our goal is to reduce the handling of wild fish, obtain a 95% detection efficiency of tagged fish, and reduce the prespawning mortality observed in the stream.

Typically, only spring chinook endemic to the Warm Springs River are used for broodstock. The only other stock intentionally brought into the hatchery have been eggs and fish from Round Butte State Fish Hatchery located at river mile 100 on the Deschutes River. The Round Butte stock was also derived from spring chinook endemic to the Deschutes River.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This

will help reduce the retention time in the downstream migration. Rearing smolts on parent river water can help reduce straying when they return as adults as well as increase their survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond. The specific rearing and release strategies used at this hatchery are detailed below.

Spring Chinook: The, operation plan calls for a total production target of 750,000 spring chinook smolts. Approximately 10 percent of the fish are reared to a yearling size of 12 fish/pound and volitional released in the fall. The remaining fish are released the following spring as 1+ age smolts. All juvenile fish released from the hatchery are marked (coded-wire tagged and adipose fin clipped) to differentiate them from wild fish upon return.

The effect of releases of juveniles from the hatchery on wild fish needs to be closely examined, especially in regards to the fall release program. Our goal is to release functional smolts that emigrate quickly downstream. The fall release program is scheduled to continue, but on a limited scale. Studies being pursued to understand the fate of fall migrants include differential marking, downstream monitoring, and scale analysis projects.

In addition, as budget allows, the hatchery plans on constructing shade structures over the rearing ponds. These structures will diffuse the direct sunlight on the ponds simulating the natural environment as seen in the forested headwater stream sections.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adults for the hatchery program are collected throughout the entire run to ensure that the run timing for this stock is maintained. When at least 1,200 wild fish are expected to be passed upstream of the hatchery, approximately 10 percent of the broodstock will be of wild fish origin. This practice will help promote the retention of wild genetic traits in the hatchery broodstock and ensure sufficient escapement of wild fish upstream of the hatchery.

Spawning Protocol

The intent is to utilize a spawning population of at least 700 adults and use a 1:1 male-to-female spawning ratio. When numbers of returning males are low, the male-to-female spawning ratio will be 1:2. When less than 500 broodstock are available, in order to increase effective population size, the number of eggs taken from each female is divided in two and fertilized with gametes from unique males. Fish that are 60 centimeters or longer will be considered adults. A minimum of 2 percent of

the broodstock will be fish less than 60 centimeters in length and approximately 10 percent of the broodstock will be wild fish.

Acceptable Stocks

Only spring chinook indigenous to the Warm Springs River are used for broodstock. During low return years to the hatchery, surplus Round Butte stock will be considered for transfer to Warm Springs hatchery. Round Butte stock will be spawned and reared separate from Warm Springs stock.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at USFWS hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

The USFWS has Fish Health Policy and Implementation Guidelines as well as disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies to diagnose the cause of fish loss.
- Prescribe appropriate treatments and remedies to disease.
- Follow USFWS Fish Health Policy and Implementation Guidelines for restrictions on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs

and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the prophylactic use of vaccines in order to prevent a disease problem.

- Follow USFWS Fish Health Policy and Implementation Guidelines on the introduction of stocks into a facility which may result in the introduction of a new disease condition or mortality.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index) to help optimize the quality of the aquatic environment and minimize fish stress which can amplify pathogens resulting in disease outbreaks. Note: the Density Index is used to estimate the maximum number of fish (of a given length) that can occupy a rearing unit based on the rearing unit's size. The Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.
- An advance engineering plan is being developed to improve the water quality for rearing spring chinook juveniles.

Fish Health Activities at Warm Springs NFH

Health Monitoring

- On at least a monthly basis, both healthy and clinically diseased fish from each fish lot are given a health exam. The sample includes a minimum of 10 fish per lot per month.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleens are examined for viral pathogens from each species.
- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit. This sample consists of a minimum of 60 fish per lot.
- Whenever abnormal behavior or mortality is observed, the fish health specialist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.

- Reporting and control of specific fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor as a disinfectant.
- Fertilized eggs from each female are incubated separately until eye-up. After eye-up eggs are segregated based on the females BKD group, as measured by ELISA.
- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections.
- Formalin (37% formaldehyde) is dispensed into water for the control of fungus on eggs and the control of parasites on juveniles and adult salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration or those under Investigative New Animal Drug (INAD) permits are used for treatments.
- An experimental feeding of erythromycin is being coordinated through an INAD permit.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor as per the USFWS Fish Health Policy.
- All equipment (nets, tanks, rain gear) is disinfected with iodophor between different fish/egg lots.
- Different fish/egg lots are physically distinct and kept in separate ponds or incubation units.

- Tank trucks or tagging trailers are disinfected when brought onto the station.
- Foot baths containing iodophor are strategically located on the hatchery grounds (i.e., entrance to hatchery building) to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at USFWS facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery:

- *Total Suspended Solids (TSS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.
- *Settleable Solids (SS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.
- *In-hatchery Water Temperatures*—maximum, minimum and average daily.
- *In-hatchery Dissolved Oxygen, Nitrogen, Ammonia, and pH*—as needed by changes in flow or temperature.

Objective 6: Communicate effectively with other salmon producers and managers.

Coordination/Communication within USFWS

The hatchery holds quarterly hatchery evaluation team and monthly coordination meetings. These meetings include hatchery, management, fish health and tribal representatives. Cooperators and other interested parties are invited to hear reports on the accomplishments, review plans, and present management programs that might affect, or be affected by hatchery operations. The hatchery evaluation team prepares an annual broodyear report for monitoring our progress at meeting hatchery objectives. These meetings also serve as a forum to share technical information. Production goals are set by the hatchery evaluation team and

coordinated with the co-managers through the Production Advisory Committee, with concurrence of the Regional office.

Interagency Coordination/Communication

The USFWS hatchery managers communicate through the regional “Fishery Resource Offices,” and a basin-wide “Columbia River Fisheries Program Office” that participates in the following forums:

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues as part of the Columbia River Fish Management Plan and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of co-managers. This group provides harvest management direction used in establishing hatchery fish production goals as part of the Columbia River Fish Management Plan.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and develops regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet throughout the year to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

Operation Plan Meetings: The USFWS meets with the CTWSRO to develop a hatchery operations plan. This plan is our policy guidance and has the concurrence of the CTWSRO, ODFW, and USFWS. Following the principles of adaptive management, this operations plan is revised periodically (about every 5 years) to reflect changes in technology, philosophy, and operational experience. Monthly coordination meetings are also held with the CTWSRO to discuss hatchery operations.

Record Keeping

This station reports through the Columbia River Information System (CRIS) of the U.S. Fish and Wildlife Service. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development.

The CIS development is being funded by Bonneville Power Administration. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The following three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-WARM SPRINGS NATIONAL FISH HATCHERY

Objective 1

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adult Capture	CHS	700	407	52-79 1	1
Adult Prespawning Survival	CHS	90%	92%	89-97%	
Egg-take	CHS	975K	435K	73K-853K	1
Green Egg-to-Fry Survival	CHS	96%	97%	92-99%	2
Fry-to-Smolt Survival	CHS	95%	95%	94-97%	
Fish Releases (1989-93 broods)	CHS	750K	652K	404K-1,075K	1
Egg Transfers	CHS	0	0	0	
Fish Transfers	CHS	0	0	0	
Wild Adults Passed Upstream	CHS	1,200	599	237-973	1
Percent Survival, Juvenile to Adult (1986-90 broods)	CHS	0.5%	0.12%	0.005-0.28%	3

Objective 2

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Smolt Size at Release (fish/lb)	CHS	12	1 2	8 - 2 1	
Acclimation	CHS	Yes	Yes	—	
Volitional Release	CHS	Partial	Partial	—	4

N/A=Not applicable.

Objective 3

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Collect Adults Throughout Run	CHS	Yes	Yes	--	
Spawning Pop. >500	CHS	Yes	292	51-572	
Spawning Ratio Male:Female	CHS	1:1	1:1.27	1:1.2-1:1.38	

Objective 4

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Adhere to Disease Policy	CHS	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

<u>Species/Stock</u>	<u>Water Supply Inc.</u>	<u>Supply Rear.</u>	<u>Virus</u>	<u>BKD</u>	<u>Furunc./ERM</u>	<u>Other/Comments</u>
<u>Warm Springs Hatchery</u> SA	SA					
CHS/Warm Springs			IHN (adult)	+	Furunc. (adult)	C. <i>shasta</i> (adult)
CHS/Round Butte				+		EIBS (adult) C. <i>shasta</i> (adult)
CHS/Warm Springs X Carson				+		1994-95 only

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the U.S. Fish and Wildlife Service.)

Objective 5

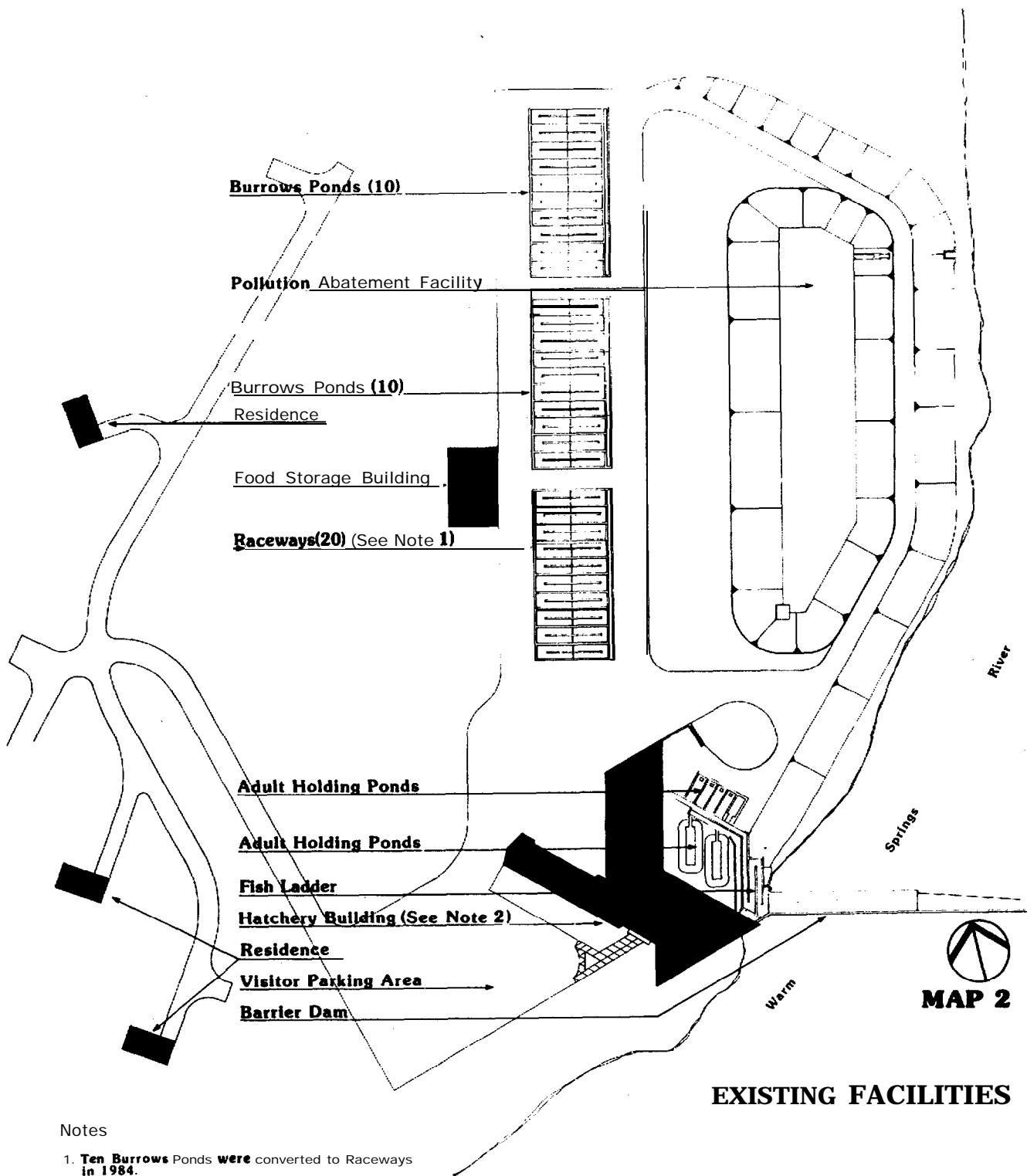
<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Meet Requirements of NPDES Permit	All	Yes	Yes	--	

Objective 6

<u>Measures</u>	<u>Species</u>	<u>Hatchery Goal</u>	<u>5-Year Average</u>	<u>Range</u>	<u>Constraints</u>
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Doc.	All	Yes	No	--	5
Develop and Review Future Brood Doc.	A I I	Yes	Yes	--	
Develop and Review Current Brood Doc.	All	Yes	Yes	--	

Constraints/Comments-Warm Springs National Fish Hatchery

1. Low returns of wild and hatchery fish prevent meeting goals. Adults include three, four, and five-year old fish. Juvenile releases include broodyears 1989-1993.
2. Culling of eggs from high titer, BKD adult carriers reduces egg-take.
3. Low survival is caused by several factors, including high summer water temperatures, untreated water, parasite loads, BKD, and Columbia River passage problems past The Dalles and Bonneville dams. Percent survival is from juvenile release to return to hatchery plus Deschutes River fishery.
4. Concerns over wild fish interactions prevent complete volitional release.
5. The Equilibrium Brood Document has not been completed at this time.



EXISTING FACILITIES

Notes

1. **Ten Burrows Ponds were converted to Raceways in 1984.**
2. **The Intake Structure, Water Treatment Facilities, Tank Room, Administrative Area, Shop and Vehicle Storage are located within the Hatchery Building.**

STATION DEVELOPMENT PLAN

WARM SPRINGS

NATIONAL FISH HATCHERY

U.S. FISH AND WILDLIFE SERVICE